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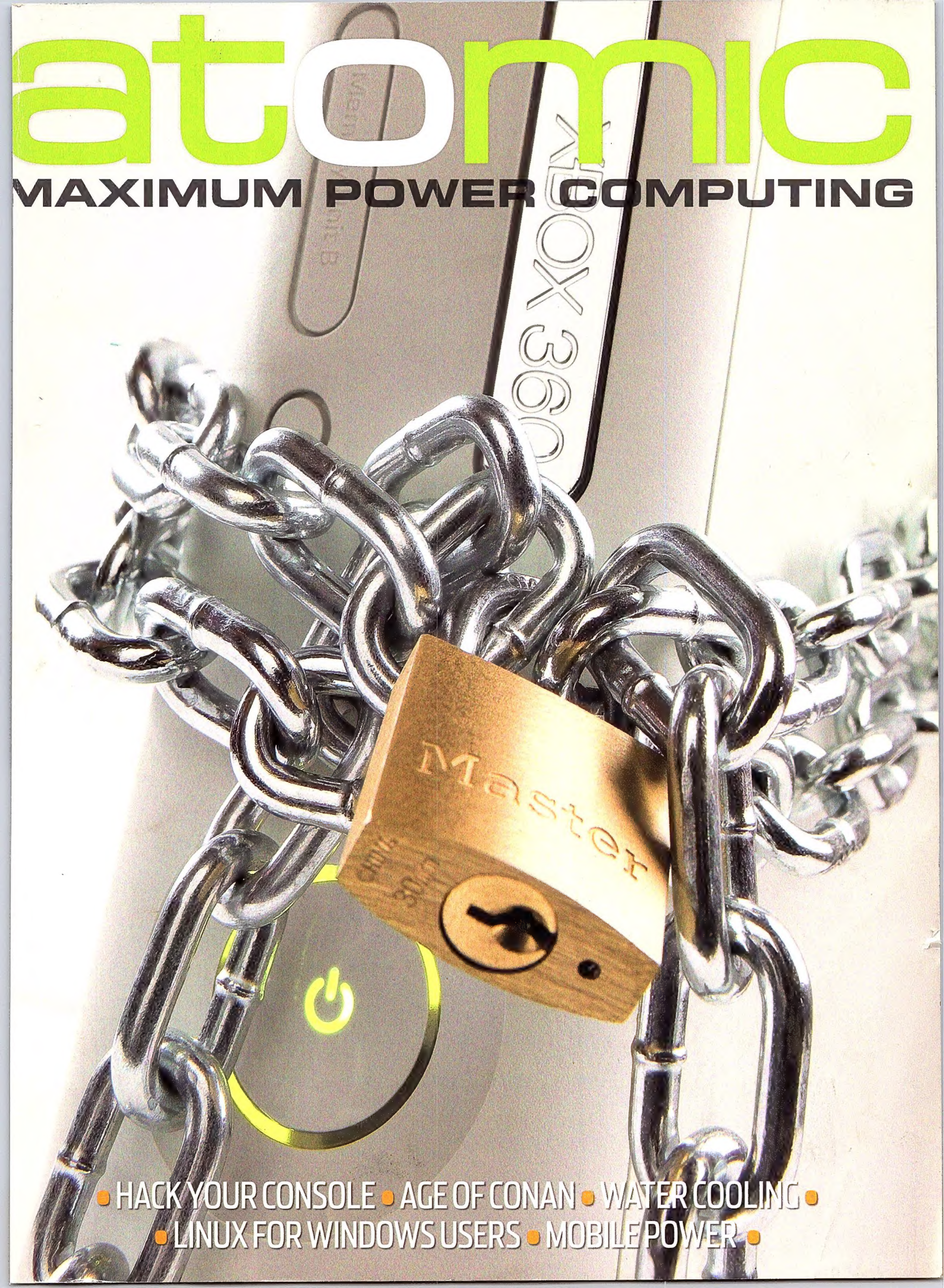

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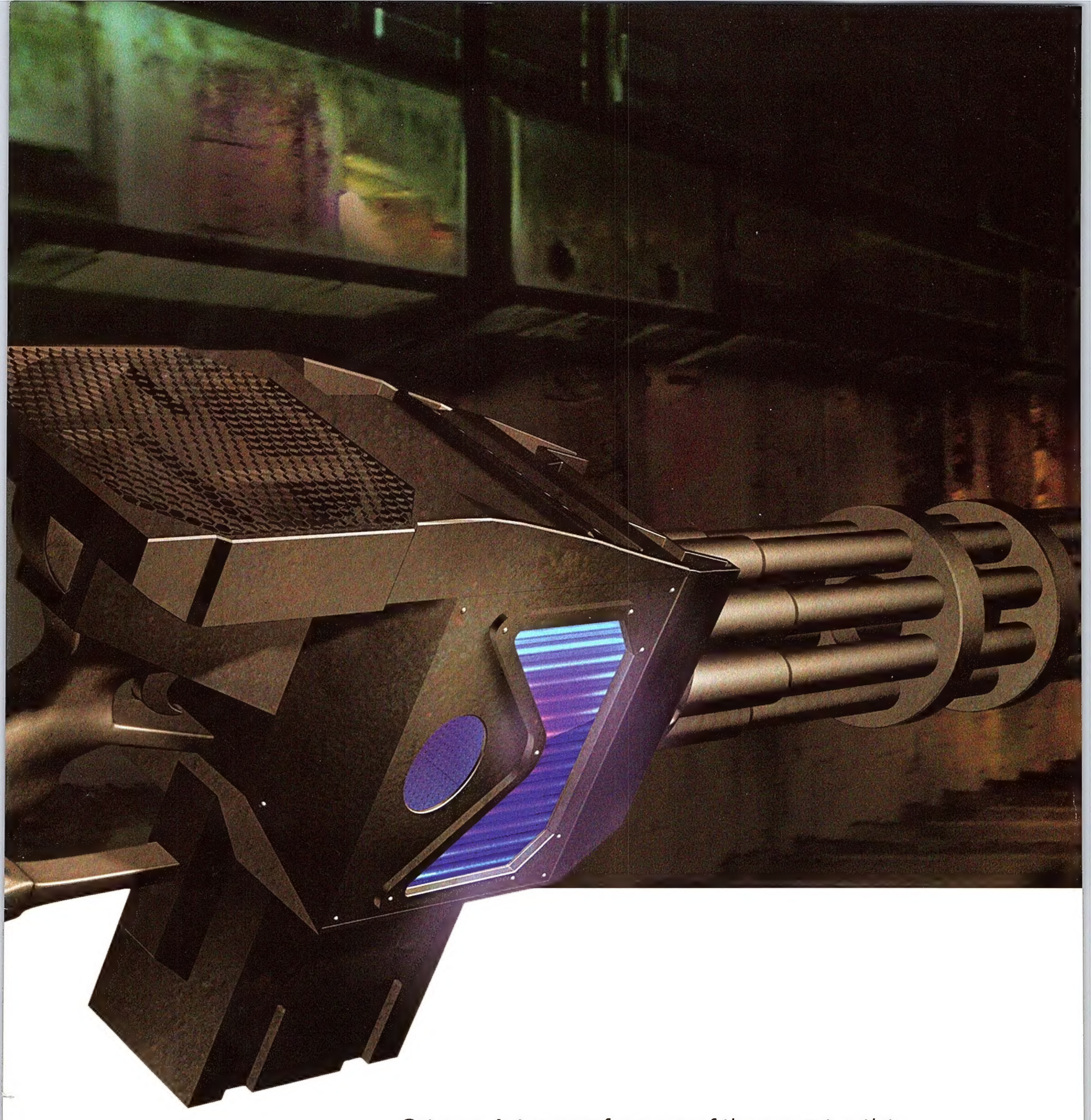

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EDHEAD

Hack the bone!

It's time for a bit of controversy this month.

We, as computing enthusiasts, independent minded gamers, and generally informed PC users, have a belief that we should be able to do what we want with the tech we own. Apart from achieving better performance, it's this spirit that fires many overclockers to insane heights of speed and arctic-grade cooling.

But what can you do with the console sitting in your loungeroom, or that handheld in your backpack that you love so much?

We've got the answer. Mod the living daylights out of it.

We're very proud of our feature (which you can skip to now, if you're excited, I won't mind), and hope that you all get a lot of good use out of it. But I feel it's necessary to offer a few extra warnings up front.

First – and we re-iterate this in the feature itself – we are not going to show you how to run pirated games on your machines. The truth is, we support the games industry, and they support us, so we'd like to think that you're all willing to keep that industry ticking over.

Secondly, this is something that, in all seriousness, you do at your own risk. You're likely going to void the warranty on your precious little bundle of joy by messing about with it as we advise, but then again, I think we all void the warranty on a lot of stuff we own as matter of reflex. It's our stuff, right, and who's Da Man to tell us what to do with it.

Still, if any fiddling with the software or hardware on your console leads to irreparable damage, you may not be left with anything more to do than have a little cry.

And that's fair enough. I always feel a little misty whenever Josh fries anything in the Labs. Those plucky little chips!

Those two points aside – go crazy! We're going to open up whole worlds of cool new stuff on your consoles, both in this mag, and in the various links we've gathered in the feature.

Remember – it's your console, your way.

Finally, in the ongoing saga of my sartorial (or proposed lack thereof – the thread is 12 pages and counting) elegance, I'm proud to unveil the Atomic Photographatician's latest work in the field of Fine Authorial Portraiture.

David *'Cutter'* Hollingworth
dhollingworth@atomicmpc.com.au

ATOMICCREW

editorial editorial@atomicmpc.com.au
technical writer **josh *'spanner'* collins**
online editor **david *'monkeywrench'* field**
sub editor **james *'socket'* macleod**

creative director **sam *'pliers'* grimmer**

design design@atomicmpc.com.au
art director **david *'healing brush'* west**
product photography **jason *'lense'* busch**

contributors
dan rutter, ashton mills, jake carroll, chris taylor, ron prouse, zara baxter, stephen reeves, logan booker

production
production manager **angela sutherland**
production co-ordinator **ewa grygier**
printed by **webstar**

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network distribution company
(02) 9282 8777
gordon & gotch new zealand
(09) 625 3005

advertising + marketing
t+61 2 8399 3611 f+61 2 8399 3622
group advertising manager **joanne *'can my middle name be pink?'* nichols**
jnichols@haymarketmedia.com.au

haymarket media
t+61 2 8399 3611 f+61 2 8399 3622
52 victoria street, mcmahons point
nsw 2060

managing director **jeremy vaughan**
publisher **jon westnedge**

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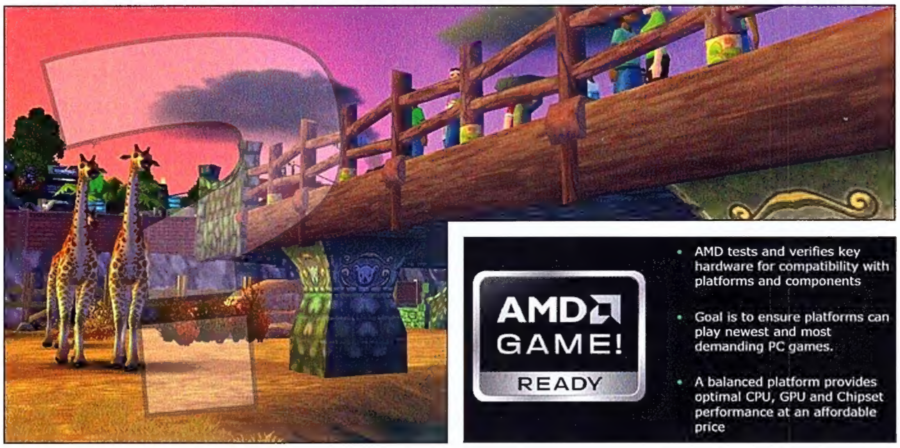
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Got game?

Does the 'A' in AMD stand for assimilation? James Matson investigates.

Whether you're an obsessive disciple of the Playstation 3 or a devout PC gamer who can't stand the thought of being in the same room as a console lover, there's one thing you can't deny about console gaming – its simplicity.

The comfort of knowing that with a console, the games bought for it will run adequately and meet all requirements is something few PC gamers – with their myriad of hardware and software combinations – can ever hope to feel. AMD has recently decided to have a crack at changing all this with its 'AMD Game!' initiative. The concept is simple, make it easier for PC gamers to buy a system or components that will play modern titles at good frame rates and quality levels.

This will be achieved through an AMD-tested and -verified set of standards that will pass a system build as being capable of playing the latest and greatest PC games at a reasonable level of consumer enjoyment. Sifting through all the pretty charts and visual aids leads us to conclude that the target audience is in the mainstream bracket, leaving the 'enthusiasts' to fend for themselves (because they can) and the 'value' computer buyers out of the equation because they don't care. The requirements for systems that will feature the 'AMD Game!' approval range from the lower end dual-core AMD 5600 CPU, ATI Radeon HD 3650 GPU and AMD's own 770 chipset to higher end builds featuring Phenom triple-core CPUs. AMD desktop product manager Brent Barry commented on the initial push for Phenom architecture.

"I made my first recommendations around the Phenom X3. It was what I wanted to sell. But when we started talking to customers the feedback was consistent; people wanted dual-core. So we took the feedback on board and put together a dual-core platform as the minimum requirement package."

The testing that AMD performs seems reasonable enough; in order to achieve the 'AMD Game!' or 'AMD Game Ultra' verification, the system must be able to play a range of top tier titles at a steady 30 frames per second in either 1280 x 1024 or 1600 x 1200 respectively. The measurement graphs we were shown indicate some dubious games being used for testing. *World Of Warcraft*? *Zoo Tycoon 2*? Seriously not the first places we'd look for something cutting edge to make your system bleed silicon tears.

It's an interesting theoretical gambit, and the benefits of standardised hardware in PC gaming land are obvious, but the wheels come off when you start looking a little closer.

'AMD Game!' is driven, not by an independent group, but a manufacturer of some of the hardware in question. You have as much chance of seeing something made by Intel being included in the approved builds as you do of seeing an assemblage of Satanists at your local Sunday church services, which is distressing because Intel still makes up the vast percentage of the market and to date still shows better bang-for-buck performance in gaming.

The initiative is currently being championed by a collection of boutique PC manufacturers you can check out at **http://game.amd.com**, and among them are brands like Alienware, who aren't exactly synonymous with the mainstream demographic AMD is targeting. We muse over whether the intended audience will ever embrace the standards being pushed.

The final nail in the future coffin of AMD's brainchild probably comes in the form of how much PC gamers secretly enjoy their menagerie of hardware. Complain all you want when there's driver incompatibility or unsupported GPUs, the fact remains that having a certain unique feel to your rig can at times crush the 'everyone is equal' feeling of console-land. Being able to alter gaming performance through specific hardware upgrades is a joy in the world of the PC gamer, as is the comfort of knowing the technology usually comes hot and steaming to PCs before it gets dumped into consoles. We're unlikely to be giving these treasured feelings up for the stale comfort of knowing that everything will run 'reasonably' on assembly line builds. Or is that just us?

> " I made my recommendations around the Phenom X3. It was what I wanted to sell. "

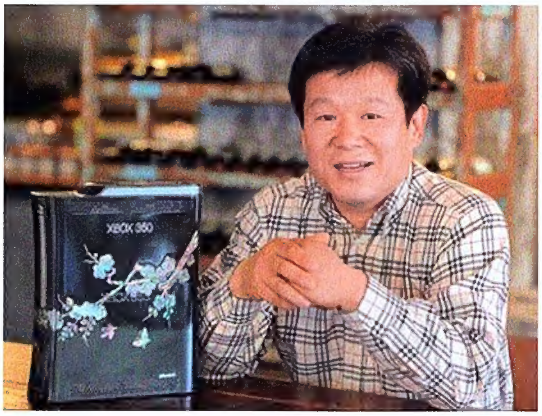
SHORT CIRCUITS

With patch 2.4 and subsequent releases Blizzard seems focused on a path for *World Of Warcraft* that makes it even more casual player friendly. Dropping attunement requirements for dungeons among other restrictions leads to a far easier time for players in general. But what does this mean for the overall challenge of the game? What happens to all those hardcore gamers who truly thrive on the more edgy and hard fought challenges that *WoW* promises those with time to burn. Games without challenge quickly become bland, and an air of resentment may stir up as players who spent considerable time becoming attuned for high level dungeons look back to see newer players get the same rewards without the effort.

Denial of service (DOS) attacks used to be the buzzword of the hacking world, but has since died off as prevention and counter measures were put in place. Fortunately for those with a penchant for the mischievous a new type of attack – labeled phlashing – has been brought into the limelight by Rich Smith, head of research for offensive technologies & threats at HP systems security lab. Phlashing remotely attacks the binaries in the firmware of embedded systems, and is a

Xbox 360: the gift that keeps on giving

Schmoozing politicians with an Xbox 360? Geek-tastic.

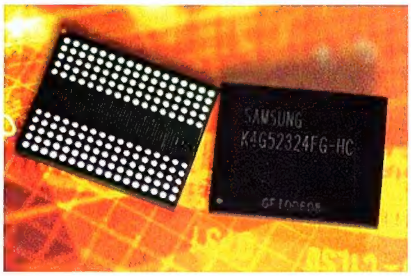


We like this purely because it's got that special geek feeling all over it, like a Star Trek convention or a garage sale of Amiga hardware. When Bill Gates recently met South Korean president Lee Myung-bak, he came bearing the gift of an Xbox 360. But unlike any number of other Xbox consoles, this one was inlaid with traditional Korean mother-of-pearl.

Searching for something to make the gift unique, Microsoft unearthed the decorative talents of Kim Young-jun, head of manufacting company 'Gookbo'. The design adorning Microsoft's console symbolises traditional Korean beauty and the final work has been entitled 'Peace'. All very warm and fuzzy really, but what we're interested in is what Bill might have thrown the way of North Korea? Our money is on a copy of Microsoft Bob, inlaid with a crayon design depicting 'fail'.

Another day another number

Will GDDR-5 keep the GPU performance monster alive?



Say what you like about the GPU being the heart of the humble graphics card, it's the memory interface that keeps pushing those lovely pixels onto your screen at an acceptable rate. With NVIDIA reaching the end of the GDDR-3 lifecycle and ATI not far behind with GDDR-4, all eyes are turning towards GDDR-5, scheduled to see a home in PCBs later this year.

The new memory format looks set to offer clock speeds ranging from 5 – 6GHz with a bandwidth of around 160GB/sec through a 256-bit memory bus. With Infineon claiming it's ready to mass produce 512MB GDDR-5 modules and Hynix talking up 1GB modules it's only a matter of time before we all get to test-drive yet another round of tech designed to push the last ounces of performance out of consumer GPUs.

PIPELINE

Dungeon Hero

March 2009

We're praying – penitent – that the title is just a work in progress, but bland naming conventions aside *Dungeon Hero* is shaping up to be one hell of a good old fashioned dungeon romp with a crazy twist. The protagonist isn't in the story to kill, crush and destroy the Goblin-infested dungeons of the game, but to save them. You play a human mercenary hired by a tribe of underground dwelling goblins to help ward off the impending attack of rival goblin factions. Developer Firefly is talking up the exploration and immersion factor of *Dungeon Hero*, claiming the 'dungeons' in-game are living breathing worlds where goblins live, work and play. It's a dungeon from the point of view of the inhabitants rather than just a place to lay waste to. Sounds neat, we hope they pull it off in style.

[Platform] PC, Xbox 360
[Developer] Firefly studios
[Publisher] Gamecock
[Web] www.heroherohero.com

one-shot DOS attack, as once you've corrupted the firmware it's unlikely the target system will be online, meaning no further action is required. It's scary enough we suggest wrapping your firmware chips in tinfoil now.

In an effort to tap into the immense popularity of online communities driven by gamers, Disney has launched 'DGamer', an online portal for Nintendo DS users allowing them to create online profiles, track accomplishments and interface with other DS gamers. The whole vision is based on an environment that not only delivers connectivity between fans of Disney games on the DS, but is built on a foundation that is 'safe' for children; how they'll achieve that is anyone's guess.

If you're one of those kindly souls that dedicate their spare CPU cycles to the greater good that is Folding@Home, you may be interested to learn that it'll now be possible to enjoy a bit of gaming madness at the same time you're finding the cure for cancer. 'Foldit' is the brainchild of Howard Hughes Medical Institute researcher David Barker, who designed the game component to allow Folding@Home users to manipulate on-screen images of protein chains and attempt to predict their folding patterns. Erm, yes – we'll be over 'there' playing Age of Conan.

1337 gamers and competitive types take note! The World GamesMasters Tournament is back and about to go off! Qualifiers for *CS: S*, *Warcraft 3* and *Quake 4* are set to start mid July and run until September. Then, the mighty finalists will be gathered under one roof to compete for over $15,000 in prizes at Atomic LIVE 2008! Awesome sauce! For more details, check out **www.atomicmpc.com.au/wgt.asp**

ATOMICCHAT

Talking to the finest human beings on earth...

DJ Trip

David Hollingworth has a sit down with a DJ who specialises in the sweet sounds of retro gaming.

We met DJ Trip – AKA Tyson Hopprich – at the Game On exhibition down in Melbourne. He was speaking on a panel about game collecting, and he waxed lyrical about retro games, groovy sounds, and more. So lyrical, that we thought he was a natural to feature in the mag.

atomic What came first? The musical leanings or the gaming obsession?

DJ Trip: Firstly the music, indirectly; I learnt to count on a 7in jukebox and then came the game playing and collecting obsession. This was ignited, partly, due to my father and grandmother.

They were both gamers addicted to the ColecoVision console back in the early 80s (that's one cool grannie – *ed*) and when it was eventually handed down to me it was 'Game Over'. I now have an ever growing collection of rare games, CD and vinyl soundtracks, weird controllers, Japanese merchandise, nerdy t-shirts and other related game books. Finally music appeared again, this time directly after buying a Commodore Amiga in high school, after which I learnt to compose using various audio trackers.

atomic How did you get the idea to start mixing music and games?

DJT: Before I started to write music I used to record the sound tests from favourite games to tape, and I was extremely obsessed with C64 chips and tunes, and the Demo Scene music. My new release 'SID Vicious' is my way of offering a homage and paying respect to the music that I had listened to and learnt so much from in my early years. I don't really use sounds from games in my music but rather use the sound chips from obsolete computers and consoles. My current kit is the Commodore Amiga, Commodore 64, Nintendo Game Boy and a PC. I am also currently experimenting with the PlayStation Portable for live composition.

> "... music appeared again, this time directly after buying a Commodore Amiga in High School..."

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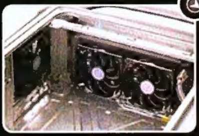

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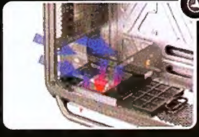

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atomic Do you only use retro games as musical sources?

DJT: No. I use a combination of raw materials, old to new pending on the goal and project. In scores for theatre, dance and film I compose with an up-to-date PC and record various session musicians to help build my sound palette for a project, and then combine various low-bit textures to keep my signature sound. On the other hand 'SID Vicious' is a very focused EP based around the dirty, fat, lo-fi sound of old consoles, giving the proverbial punk finger to current music equipment.

> "As a musician and DJ I prefer to buy my music on CD; to support the artist and because I love the artwork..."

atomic How is your music received when you play live?

DJT: In a live club environment my music usually goes down quite well with a dedicated bunch of geeks and freaks busting crazy moves on the floor and at each other.

atomic What's the feedback been like from the media on your music? Is there a problem with critics just not 'getting it'?

DJT: Media-wise people understand it a lot easier than when I started in 1998. The eight-bit scene and the gaming community are more prominent than they used to be. The internet has also made it all a lot more accessible and global.

atomic And the ubiquitous question about file-sharing, and piracy. Where do you stand on the distribution of music?

DJT: As a musician and DJ I prefer to buy my music on CD; firstly support the artist and because I love the artwork, quality and packaging of a CD. I respect artists who put their music for free download as creative commons, though. Sometimes you need to put love out to get it back.

I believe file-sharing really kills your passion and love of music. People just end up with their iPod's full of 'filler not killer' music.

atomic And finally, the important stuff. What's your favourite game of all time, both musically and just to play?

DJT: To listen to it switches between Super Castlevania IV and We Love Katamari.

To play it has to be Legend of Zelda: The Ocarina of Time.

If you want to know a bit more about DJ Trip, check out his site at **www.myspace.com/finddjtrip**. Incidentally, his EP, Sid Vicious, is on high rotation in the Atomic HQ. Track it down if you want to get some warm fuzzy retro sounds in your life.

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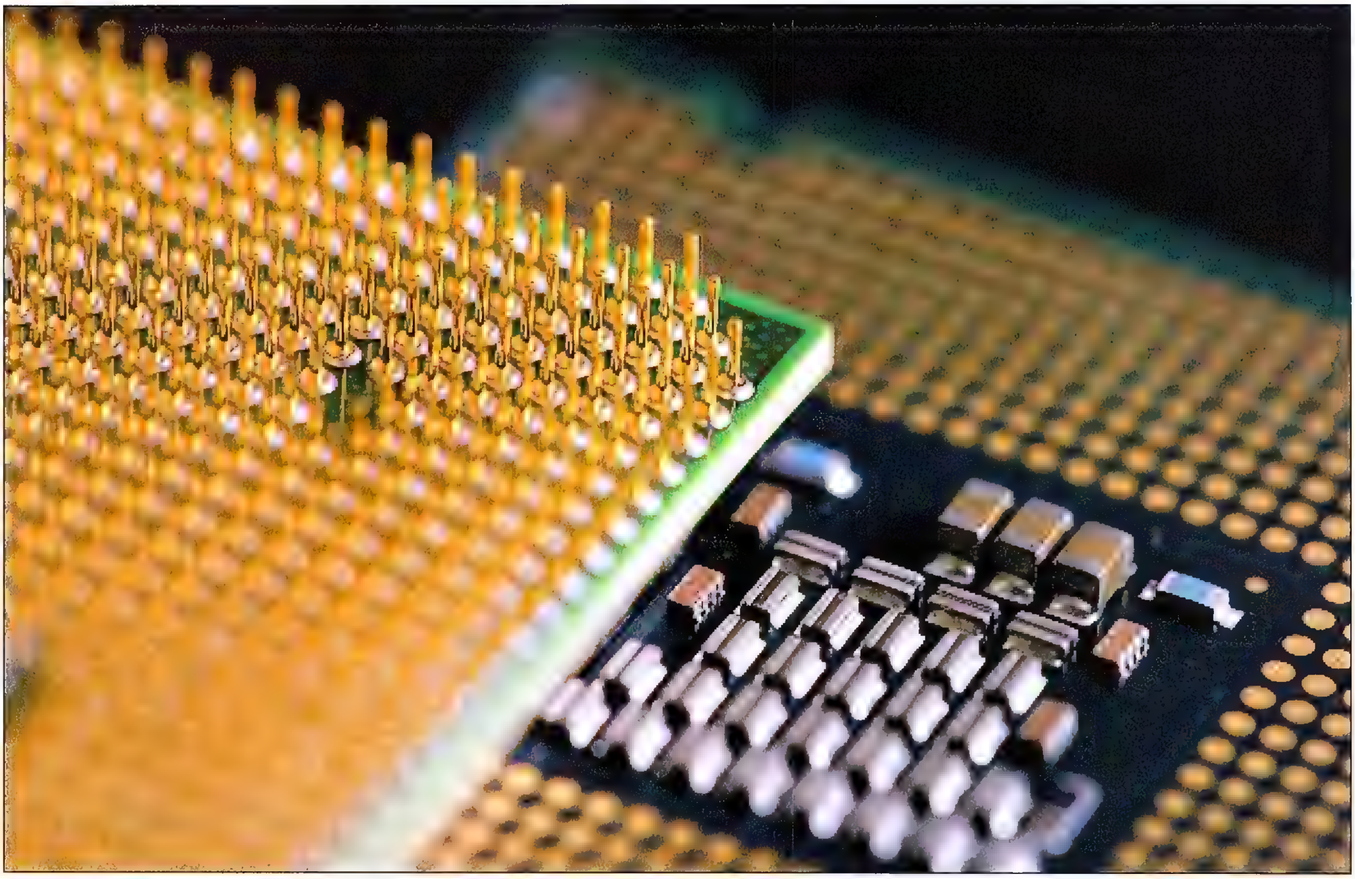


The cache

Five-star support crew to the key members of your PC's band, the cache is a technology underpin that helps your gear perform faster and better. **Ashton Mills** goes on tour.

According to Wikipedia the cache as a concept began in 1967 when boffins at IBM suggested a memory improvement design that utilised what they called the 'high speed buffer'. Apparently this was too much of a mouthful for the readership of the IBM System Journal in which a paper describing the technique was published, and the editor of the journal suggested 'cache' instead. And it's stuck ever since.

As its original name suggests, a cache is a buffer in that it can store temporary data for quick access – although technically a cache and buffer are not the same thing. In simple terms a cache acts as a fast storage mechanism for temporary data in place of a slower source, the result of which can be reduced latencies and, in turn, increased performance.

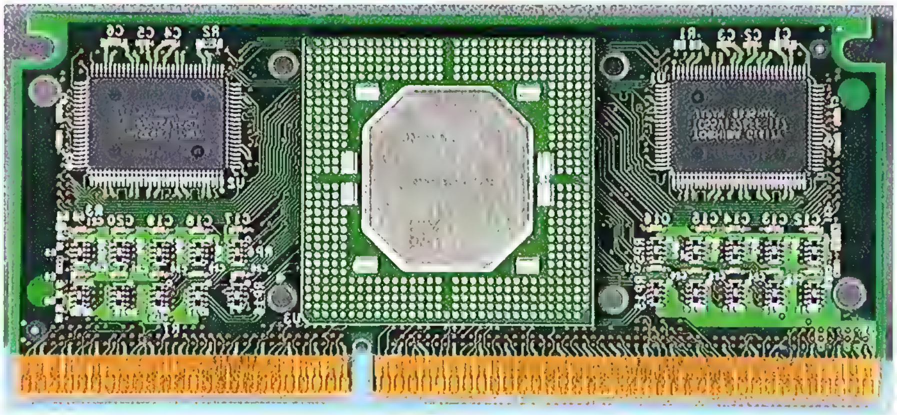
To brutally re-phrase a quote from Babylon 5, "While all caches are buffers, not all buffers are caches" (Oh you big geek -*ed*). While a cache also buffers data in that the information is readily available in the cache for quick retrieval, a buffer is instead usually used to store data in transit and is designed to flush but retain its contents unless more data pushes it out. Mostly, they're FIFO (first in first out), as you see with disk caches. Indeed, while hard drives today come with 8M, 16M, and 32M caches these are, in operation if not in name, buffers.

By contrast a *cache* will frequently continue to store whatever data is needed even as some of its contents come and go, and is used in conjunction with predictive algorithms to keep useful data where it's needed most.

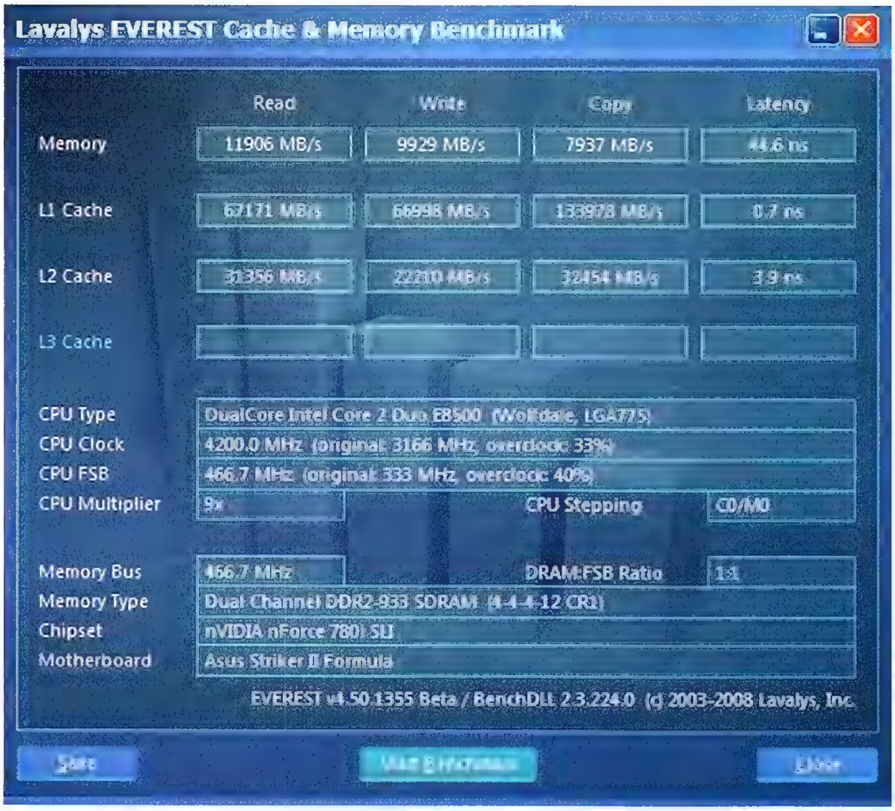
And on that note, just what are all those caches in your system and what do they do?

L1

The Level 1 cache, or L1, is built into your CPU



Hands up who remembers the Pentium II with its L2 cache and CPU separate on a PCB in a cartridge?



Lavalys EVEREST Cache & Memory Benchmark

	Read	Write	Copy	Latency
Memory	11906 MB/s	9929 MB/s	7937 MB/s	44.6 ns
L1 Cache	67171 MB/s	66998 MB/s	133978 MB/s	0.7 ns
L2 Cache	31356 MB/s	22210 MB/s	32454 MB/s	3.9 ns
L3 Cache				

CPU Type: DualCore Intel Core 2 Duo E8500 (Wolfdale, LGA775)
CPU Clock: 4200.0 MHz (original: 3166 MHz, overclock: 33%)
CPU FSB: 466.7 MHz (original: 333 MHz, overclock: 40%)
CPU Multiplier: 9x
CPU Stepping: C0/M0
Memory Bus: 466.7 MHz
DRAM:FSB Ratio: 1:1
Memory Type: Dual Channel DDR2-933 SDRAM (4-4-4-12 CR1)
Chipset: nVIDIA nForce 780i SLI
Motherboard: Asus Striker II Formula

EVEREST v4.50.1355 Beta / BenchDLL 2.3.224.0 (c) 2003-2008 Lavalys, Inc.

The L1, L2, and main memory speeds on an E8500 CPU. Note the huge differences in throughput and latency between them.

and so runs at the same speed as the CPU. This is an expensive prospect to do, and as a result L1 caches aren't very large. However they are the fastest cache in your system, and your CPU loves them. More than Vegemite loves toast, even.

In modern CPUs the L1 is frequently broken down into two specific dedicated caches: the instruction cache and the data cache.

The instruction cache, as the name suggests, caches instructions before they enter the fetch/decode/execution cycle. The data cache stores the results of calculations before being written back to the L2 cache and onto main memory. Together they can reduce latency for calculations that require instructions already in the instruction cache, or data already in the data cache, saving the need to source these from the L2 cache. Note: that is a simplistic view of cache operation – branching prediction allows the instruction prefetcher to load instructions into the L1 instruction cache in advance, while the L1 data cache can also be pre-emptively filled from the L2 cache in advance for data that is expected to be needed. It's all part of the magic, and complexity, of modern CPU design.

Finally, the L1 cache is always dedicated solely to a particular processor, or to a particular core on a multi-core processor. It's also tailored to the architecture, and size isn't necessarily an indicator of performance. Commonly, modern CPUs like Intel's Core2 use 32k for the L1 instruction and L1 data caches, for a total of 64k L1 cache. AMD's Athlon64 and Phenom lines uses 64k for the L1 instruction and L1 data respectively, for a total of 128K.

L2 and L3

If instructions and data can't be found in the L1 cache, the next step is the Level 2 cache. A loose definition of caches in general is that the larger they are, the greater the hit rate they provide at the cost of latency. This is a description apt for both L2 and L3 caches. Both are substantially larger than the L1 cache, but incur a higher latency.

The L2 is where competing processors from Intel and AMD start to differ more as well. By way of example, processors like Intel's Core2 come with whopping great big L2 caches (4MB for the 65nm brethren, 6MB for the 45nm) per dual-core. The cache is also shared between the cores. So on a 45nm quad-core Core2, although the beast comes with 12MB of L2 cache, you have to remember a Core2 quad is literally two dual-cores slapped together, and the 12MB L2 cache actually comprises two 6MB L2 caches that can't be shared between the two dual-cores. By comparison AMD's current Athlon64 and Phenom lines use dedicated L2 caches specific to each core, with 1MB cache per core on the FX-62 and 512KB per core on the Phenom.

Additionally the Phenom incorporates a 2MB shared Level 3 cache, which is really just a larger shared L2, but does allow the Phenoms to benefit from super-fast L1 and L2 caches specific to the processing tasks of each core while also gaining from a fast shared cache in the L3 between cores. It is, ultimately, a good design – and it's not surprising that Intel would appear to be learning from AMD here, as Nehalem looks to be providing smaller dedicated L2 caches per core and adding a large shared L3 cache instead when it arrives.

Shared caches have a number of benefits – they allow one core to use more than its share of cache if the other cores are using less, and they facilitate sharing of data between cores, negating the need and penalty of going to main memory.

Main memory

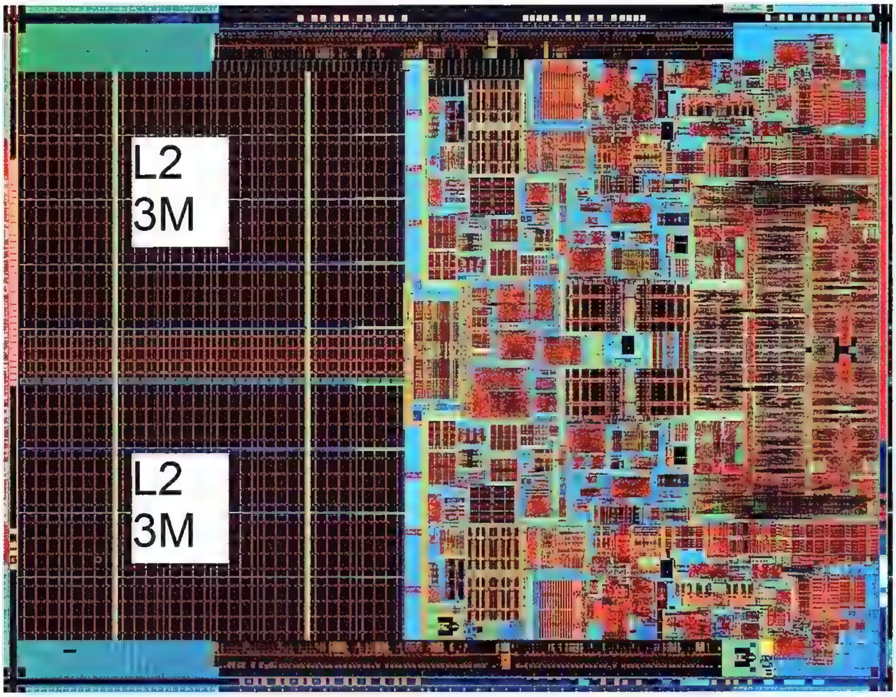
The main memory in your system, even though you may not think of it this way, is also a cache. It's the largest, and slowest, cache in your system. Off the CPU die and into the void of motherboard busses, main memory is a heck of a lot slower, but in turn

ASSOCIATIVELY SPEAKING

In order to cache data from main memory the L1, L2 and L3 cache use what's known as *set associative* mapping. Here a cache is divided up into a number of 64-byte lines (typically 8192), and broken up into blocks. Depending on if the cache is two-way, four-way, eight-way, or 16-way set associative on a 512K cache there will be 4096, 2048, 1024, or 512 blocks respectively. This associativity (you're making up words again *–ed*) specifies how main memory is mapped to the cache – in four-way set associative, each block contains four lines, eight-way eight lines and so on. Main memory is divided into the same number of blocks as the cache, and as data is requested it's loaded in 64-byte chunks into the relevant block in the cache, with up to two, four, eight, or 16 lines able to be used for that particular memory block. If data is read from memory and its corresponding cache lines are full, one or more of the lines will be emptied to accommodate the new data – but if the CPU requests data from those main memory locations that are mapped in the cache, it can be retrieved from the cache instead of main memory and thus negate the latency of accessing main memory.

By the sounds of it opting for 16-way associative would be better than eight-way, four-way, or two-way as there are more lines to cache more data for a given mapped memory block. But unless the size of the cache also increases, this will increase the size of each block mapped to main memory – so although there are more lines, each block now manages a larger chunk of main memory, reducing the granularity of the cache. Which is why there's no golden rule here, and both Intel and AMD approach associativity differently depending on their processors.

Typically, L1 caches use two-way set associative while L2 and L3 caches, depending on the processor, use four-way, eight-way, and 16-way set associative.



The L2 caches are marked – win a lock of Dave's hair if you can pinpoint the L1 caches (I am so not honouring that *–ed*)!

HIT AND MISS

A cache isn't a wonder tool, much though it may seem like one. After all, they are only as useful as the data they contain – if what the CPU is looking for isn't in a cache, data needs to be fetched from the next cache down and, ultimately, main memory. Data that is found within a cache is called a 'hit', while data that is requested and not found is called a 'miss'. It's interesting to note that your machine, clean as it is when you turn it on, starts on a miss for all caches until the first data is read in from main memory. After that, it's a jolly old game of cache management logic attempting to predict what will be needed next while your operating system and programs scatter themselves among main memory and issue instructions while they run.

you can load it up with cheap (by comparison to the cost of building memory on the CPU) RAM and store all the running data of your operating system and applications for the CPU to fetch as needed.

And we all know what happens when our operating system (gosh, here's looking at you Vista) demands more memory than the system has installed – it's off to the hard drive.

Hard drives

Hard drives are also a cache, of a particular fancy – in literal terms they are long-term non-volatile storage, and are also both larger and slower by an order of magnitude over main memory. They continue the 'greater hits, slower access' definition, with in fact a hit-rate of 100 per cent, if you think about it.

Really if RAM was non-volatile, voluminous, and cheap as chips you wouldn't need a hard drive. This is of course the tenet behind SSDs, but they are just emerging, and it will be a while before they can match the volumes of a traditional hard drive.

Then, on the drives, we frequently have the page file (or swap) which is roughly translated as RAM-on-your-disk. When main memory is full, the operating system maps data in and out of the swapfile, using it as an extension of main memory. So here we have another cache, a virtual one, caching data from main memory and stored as a file on the drive itself.

Finally, of course, hard drives have their own on-board RAM that's used to buffer data in transit to and from the system. These literally empty almost as fast as they can be filled, and while the portion used for read caching is questionable, write caching can have a big impact. Here the drive can tell the system that a write has been completed even if it actually hasn't been written to the drive yet, and in doing so allow the operating system to move onto the next write or task.

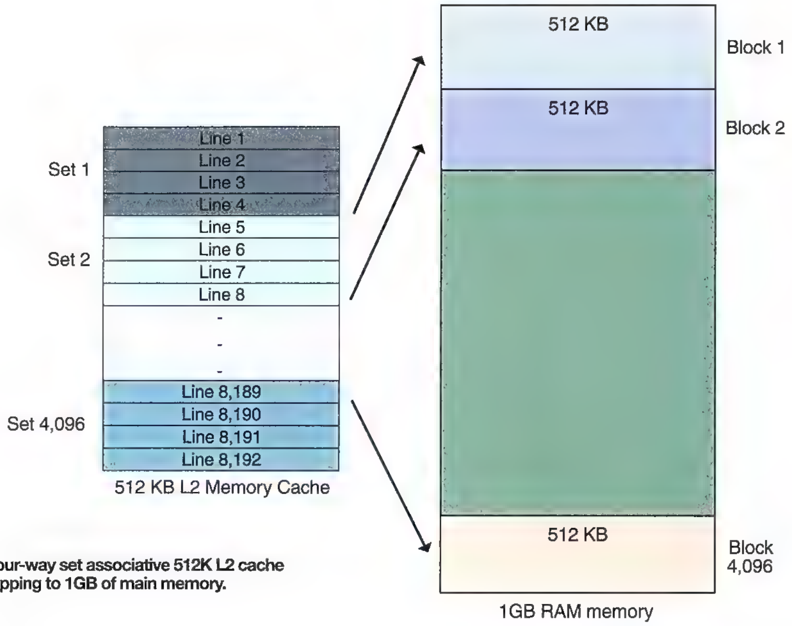
Applications

Much like using hard drive space as a buffer for memory with the page file, perversely the reverse is also true when it comes to the operating system and applications using main memory to buffer access to the disk. In one sense this is a means to effectively extend the drive's own cache, but also to keep data coming to and from drives in main memory where, if needed again, is on-hand rather than needing to go to the hard drive.

All operating systems set aside a portion of main memory as a disk cache, although technically it's a buffer. Here, the operating system can perform writes to the disk cache in memory, get an immediate response that the task is complete, and move on while the cache is later flushed to disk by the cache manager (usually handled by the operating system's kernel).

Finally, it's not just the operating system that will use main memory for caching – applications do as well. Take your browser, for example, which will use a small portion of memory for caching objects in memory in addition to a disk cache. Other applications that will use memory caching include web servers, proxies, bittorrent clients, video software, media players, and more.

All up, the cache is a concept and mechanism that is integral to the operation of your machine, and a means to maximise peformance where possible in any given subsystem.



A four-way set associative 512K L2 cache mapping to 1GB of main memory.

Fun Starts in Just 5 Seconds

Fast Access to Web, Pictures and Instant Messengers with New *Express Gate*

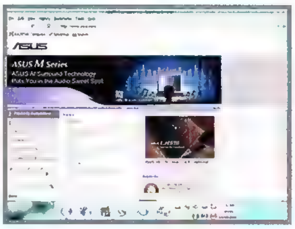
> “Time wasted on waiting for long loading times are a thing of the past. With the new ASUS ***Express Gate*** feature, you can now quickly access the Internet, view pictures or online chat in just 5 seconds from the boot-up, without any Operating System.”

Ever wished that you can skip long loading times during boot-up, and just quickly access the Internet or view pictures?

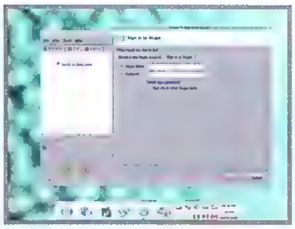
The new and exclusive ASUS Express Gate does exactly that, and in just 5 seconds after boot-up! Available on the ASUS P5Q series of motherboards, this unique innovation lets you quickly access the Internet through popular applications that include Instant Messengers, browsers and VoIP applications; and also view pictures and listen to online music - making it the perfect gateway for instant fun!

Additionally, Express Gate's user-friendly GUI allows children and the older generation to utilise its many functions with ease. The ASUS Express Gate is a unique built-in motherboard Operating System which lets you to do so much more with just a push of the power button. It even comes in a SSD version that is pre-installed with Express Gate on the onboard flash memory, allowing you access to all its functions without any connected hard disks!

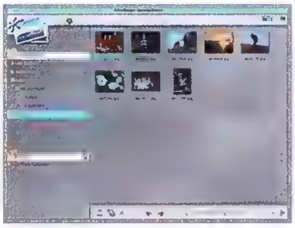
5 Seconds *from Boot-up to go Online*



Internet Access



Go on Skype



View photos

Online chat

It's the little things

Ashton Mills looks back while looking forward and… wait, that doesn't make sense!

Even when you've been playing with gear *since the beginning of time itself*, and you're rather confident you know your way around equipment well enough that you can rattle off your entire BIOS settings from memory, it's easy to forget that there's always something new to learn. Not necessarily looking forward, for every day we invent and discover something new, but looking back. In the past. Things you've always just assumed.

Like 80-pin IDE cables.

Let me start from the beginning, and add a disclaimer: I may well invalidate whatever respect you have for me. But c'est la vie.

So I built my spanky new system recently (A/S/L: E8500@4.2GHz, 8800GTS 512 SLI, 4G RAM and 1TB 10k RPM RAID) and besides tweaking it to oblivion and generally enjoying silky smooth frames in all my games (bar *Crysis*, of course), I'm like a proud father. In turn my old parts, as usual, get passed down to my gateway system – a Linux (Gentoo) box still running the Atomic Firewall from issues 20-23 and bundled up with Squid and Adzapper. How I love this box.

As my new machine was built from parts that replaced pretty much everything, I moved my entire old system as is into the 'gateway room' (aka loungeroom), and aside from dropping in a 7200.11 Seagate for extra storage, it was ready to go.

And so I grabbed the latest Ubuntu server disc (give it a go instead of Gentoo this time – one does get tired of compiling one's OS) and started the install. An install which ended about ten seconds later when the installer told me my disk didn't contain anything it could use.

Odd. I double-checked it on my new system, the disc booted and ran fine. At this point I remembered that I used to have problems every now and then on my old system with CDs and DVDs. Most were fine, but some wouldn't read. I put it down to IDE support kernel issues or ACPI, and worked around it with network installs.

> "…I moved my entire system as is into the gateway room (aka the lounge-room)…"

Still, maybe the DVD drive was just dying, or the cable was loose? The system certainly saw its fair share of being pulled apart and put back together again over a number of years.

So I checked the cable – it was snug, but I did notice that it had an attached ASUS label (the motherboard was an A8N-SLI Premium) that read 'CD-ROM cable'. Something I hadn't really noticed when I first built the system. Could it be? On the off chance, I dug up a spare 80-pin IDE cable from my box of plenty and compared – the ASUS cable had chunkier wires, aka less wires, than the IDE cable I held in my hand. The ASUS cable wasn't 80-pin, it was 68-pin.

Would this be the cause of the intermittent read problems? A quick switch later, and quick boot thereafter, and… the Ubuntu install disk read perfectly, and merrily started installing.

Which means, for the whole time I had my old system the DVD-R/CD-R drive had been hampered by the wrong cable. Strange, since the A8N-SLI was the hot new thing at the time and DVD drives were most certainly commonplace, but I had never noticed it bundled a 68-pin cable. Perhaps then, as now, I was an excited father proudly building his new baby and just didn't notice.

So there you go, always room to learn something new when you think you had it sorted. And for someone who's been building PCs for over fifteen years, can overclock while sleeping, and compiles Linux kernels just for fun, it's not the least bit embarrassing. Though it did make me chuckle.

Perhaps next time I'll buy a SATA optical drive. What could possibly go wrong there, eh?

Ashton Mills takes joy in tempting the techno fates.
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atomic Guide to Console Hacking

Want to get the most out of your PS3, XBOX 360 or Nintendo console? Jake Carroll has the knowledge you need.

A long time ago, someone laid some ground rules. These rules stated that companies would make as many electronic components as they could, and then reincarnate these same physical components into as many more expensive devices as possible. By doing this, the companies could then add features to their hardware that had been intentionally turned off in earlier revisions of the hardware or software, making the unsuspecting public pay for an upgrade for which had essentially identical physical electronics. The world wouldn't knowingly stand for such behaviour for long.

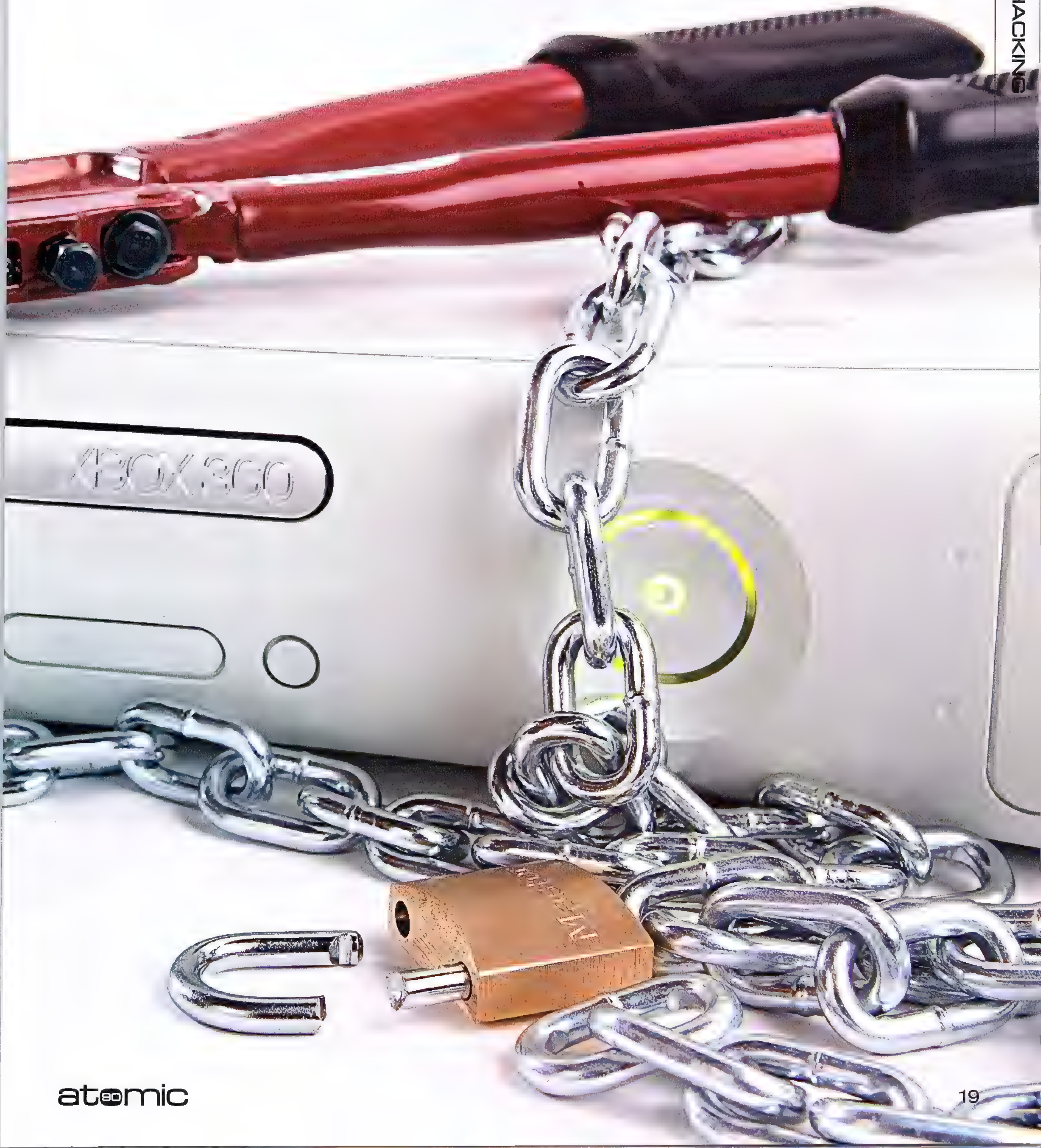
It is no wonder console hacking has become such a popular concept for so many. Why wouldn't you want your console to be able to do more?

This month, we are going on a console-hacking world tour. We'll be looking at:

- The anatomy of a console hack.
- Back yard software engineering efforts. Brew, sweet brew.
- Why modding has become so popular.
- The PAL market curse.
- The 'import companies' and what became of them.
- Retro-hacks: Making all that is old, new again.
- The dark path ahead: the hypervisor and hardware abstraction layers.

THE DISCLAIMER

Before we go any further, we need to get something straight. We aren't going to teach you to modify your console to play pirated games here. Sorry folks. You walked into the wrong freakshow tonight. If you want that kind of thing, go elsewhere. We are about the hardware, software and technology, not wrecking the games industry that both entertains and employs us! This article is about exploration, understanding and above all else, the passion within the technology. You have been warned.


XBOX 360

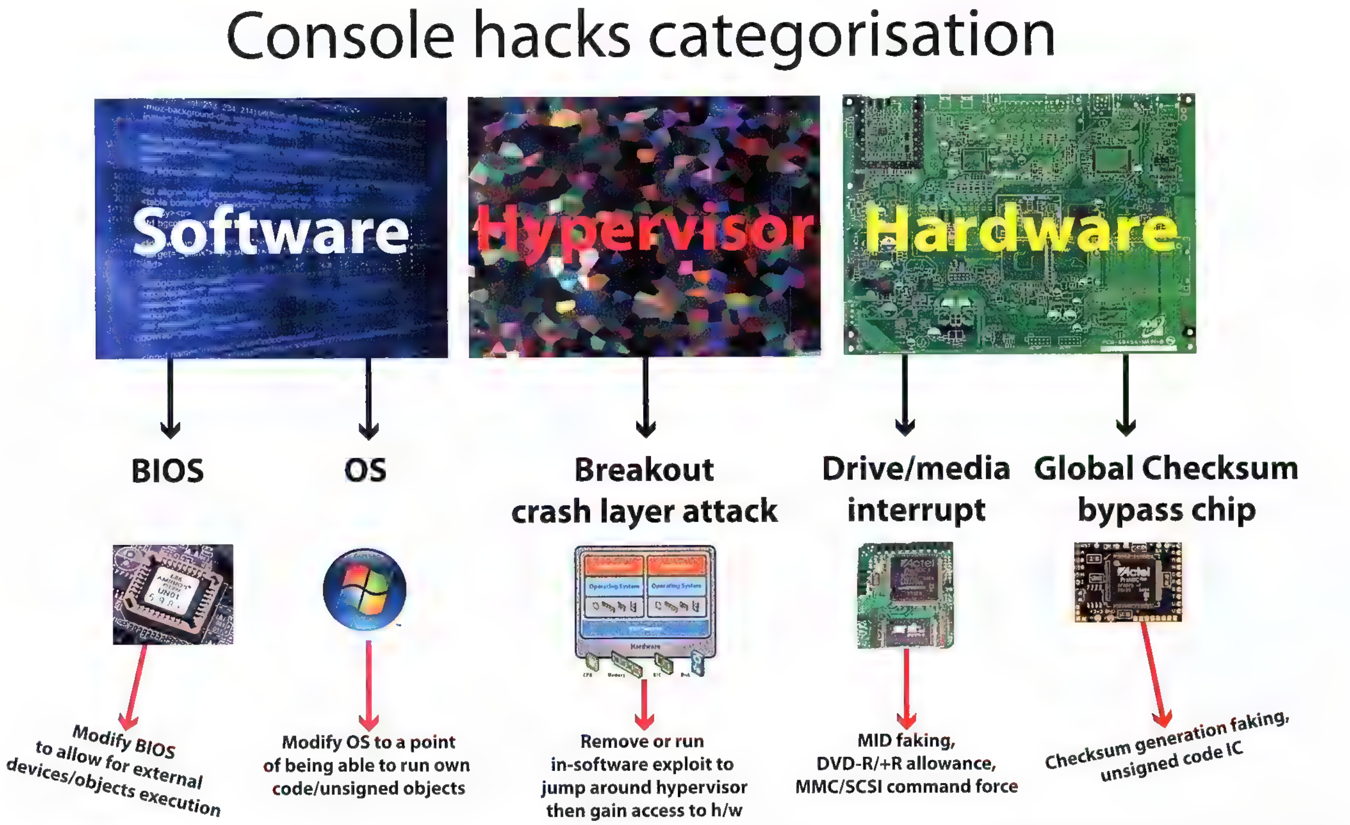

Console hacks categorisation
Software
Hypervisor
Hardware
BIOS
OS
Breakout crash layer attack
Drive/media interrupt
Global Checksum bypass chip
Modify BIOS to allow for external devices/objects execution
Modify OS to a point of being able to run own code/unsigned objects
Remove or run in-software exploit to jump around hypervisor then gain access to h/w
MID faking, DVD-R/+R allowance, MMC/SCSI command force
Checksum generation faking, unsigned code IC

Figure 1 – The three generalised types of hack used in gaming consoles.

Why has console hacking become so popular?

What has made console hacking such a popular hobby/event for console-lovers the world over? To many people, personal finances and restrictive laws have contributed to their willingness to rip apart their devices and tinker. To others, there are too many constraints on their gaming experience, or too few titles released in their homeland… or even not enough vendor support to keep a system alive. This was best illustrated by the now ‘undead’ console, the Sega Dreamcast, which enjoyed an unnaturally long life thanks to modders and homebrew hackers, if only to allow imported titles and free development to keep their overseas cousins bathed in the glow of the wonderful PowerVR chipset.

Here in the Asia/Pacific region we have an odd situation with our consoles. We not only have two distinct standards of television output/broadcast, but we have two separated gaming markets, as a direct result. The PAL and NTSC war rages on. Let us count the ways.

1. At the time of writing, one of Nintendo’s largest titles of the year, *Super Smash Brothers: Brawl* still hasn’t been released in our PAL territory. The NTSC market has been enjoying it for several months. The situation has become so bad that retail outlets are now selling the NTSC version of the software with the Datel Freeloader region bypass product for Wii.

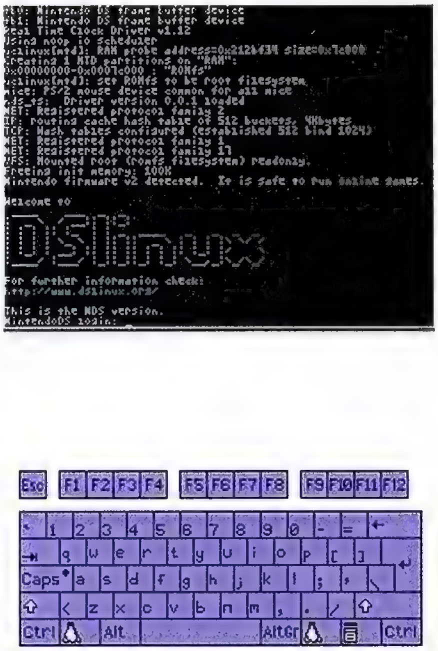
2. Our version of *Grand Theft Auto 4* has been altered significantly from the other region versions. Some argue that the censorship has gone too far (though others argue that the censorship – however bad the idea is – is actually rather light –*ed*).

3. In extreme cases, our titles have entire functions removed or are degraded in capabilities. This is most evident in titles where screen sampling speed is changed and as a direct result, our gameplay speed is actually altered by a number of frames per second, due to the difference between the PAL and NTSC scanline rendering specification

To deal with these inequities in distribution, and preserve gamers’ rights to an untainted gameplay experience and in extreme cases, functionality, people are forced down the path of either console importation, or modding (or both!).

Imports and the games market

Many a company has tried to act as a source for import titles/accessories/consoles over the years. Probably the most famous of these is the now legendary (and deceased!) Lik-Sang. As of October 24th, 2006, Lik-Sang was suspended from all business at the threat of multiple lawsuits from Sony Inc. Sony’s reasoning was that Lik-Sang were providing potentially harmful products to regions/zones that should never have had access to them, not the least of which included power adapters and Blu-ray movies for the PS3. Despite some people suggesting this was more a profit concentration tactic on Sony’s behalf, another service merchant trying to spread equal opportunity was successfully closed down. The current replacement, **play-asia.com**, has not come under fire as yet. Whether Sony’s actions were justified (or even legitimate) in closing down another importer/games dispersal mechanism is and always will be hotly debated. The fact of the matter is, when a company as large as this exerts its power upon a smaller entity, it is hard



```
fb0: Nintendo DS frame buffer device
fb1: Nintendo DS frame buffer device
Real Time Clock Driver v1.12
Using noop io scheduler
uclinux[mtd]: RAM probe address=0x212b434 size=0x7c000
Creating 1 MTD partitions on "RAM":
0x00000000-0x0007c000 : "ROMfs"
uclinux[mtd]: set ROMfs to be root filesystem
mice: PS/2 mouse device common for all mice
nds_ts:  Driver version 0.0.1 loaded
NET: Registered protocol family 2
IP: routing cache hash table of 512 buckets, 4Kbytes
TCP: Hash tables configured (established 512 bind 1024)
NET: Registered protocol family 1
NET: Registered protocol family 17
VFS: Mounted root (romfs filesystem) readonly.
Freeing init memory: 100K
Nintendo firmware v2 detected.  It is safe to run online games.

Welcome to

DSlinux

For further information check:
http://www.dslinux.org/

This is the NDS version.
NintendoDS login:
```

Esc F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12
` 1 2 3 4 5 6 7 8 9 0 - = ←
⇥ q w e r t y u i o p [ ]
Caps a s d f g h j k l ; '
⇧ < z x c v b n m , . / ⇧
Ctrl Alt AltGr Ctrl

DSLinux running on NintendoDS via DLDI loader.

ScummVM for Nintendo DS, allowing all that is old and awesome to be new again!

not to fall in line. The community suffers either way and we are forced to derail the corporate vision using our own intelligence and resources.

Anatomy of a console hack

Console hacks fall into three categories. Figure 1 shows the console hacks hierarchy.

Software-level console hacking can be broken down at the OS level or the BIOS exploit level. It has, however, taken several years for each generation of console to evolve to a point where pure software-level hacks are attainable. Notably, it has taken the lifetime of the console to get to a point of a pure software hack for the Playstation 2 (Memor32 VAST), allowing external boot loaders/chain loader code to be plugged in via a boot disc that dumps the user into a state that will run any code from any media. Similarly, the original Xbox 'softmods', as they were known, took some three years to fully develop.

Hardware level hacks are generalised into either drive hacks or bypass chips. Drive hacks tell the optical drive in a current generation console to ignore the vendor's MMC/SCSI instruction set (which often contains explicit/specific regions stating that it will ignore burnt/recordable media). This allows the end user to boot any form of media or any code they like. By far the most simplistic of all console modification techniques and the most widespread, it is also the least simple to lock down from the vendors' perspective. Global bypass chips are somewhat more complex in their methods. They tell the hardware that despite the fact that there are foreign objects in memory, or segments of unsigned code running, that the overall sum/checksum of the operating environment is 'sane'.

Then we come to a dark, strange place. The hypervisor is essentially a layer of glue sticking hardware and software together. This adhesive between hardware and 'user land' is elusive and difficult to escape. A hypervisor essentially presents hardware resources to a software environment. The trickiest part about this is that without the hypervisor, the hardware is seemingly incommunicable. Efforts are being made to launch the hypervisor, break out of the hypervisor, then utilise the hardware underneath, as if it were running through this adhesive conduit. This is as advanced as console hacking gets.

Want a brew?

Beer is good. It's better when you can get it for free though. Using homebrew (unofficial/not for profit software engineering efforts) on a console is currently a major incentive to 'mod' your hardware. Some of the best

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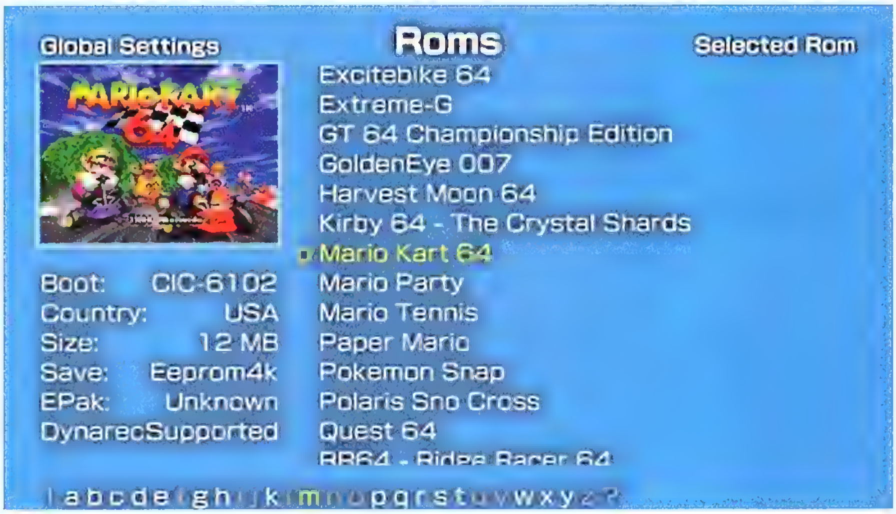


Global Settings

Roms

Selected Rom

Excitebike 64
Extreme-G
GT 64 Championship Edition
GoldenEye 007
Harvest Moon 64
Kirby 64 - The Crystal Shards
Mario Kart 64
Mario Party
Mario Tennis
Paper Mario
Pokemon Snap
Polaris Sno Cross
Quest 64
RR64 - Ridge Racer 64

Boot: CIC-6102
Country: USA
Size: 12 MB
Save: Eeprom4k
EPak: Unknown
DynarecSupported

Daedalus, the open source Nintendo 64 emulator for PSP.

brew for current generation consoles exists on the Nintendo DS, Sony's PSP and the Wii. The PS3 and Xbox 360 remain less hacked for reasons explained later in the article.

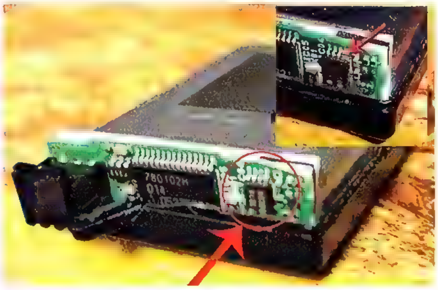
Nintendo DS Homebrew

Many people consider Nintendo's DS to be the current top dog in the homebrew scene. Through the use of Dynamically Linked Device for libfat (DLDI: **http://dldi.drunkencoders.com/index.php?title=Main_Page**), it is very easy to gain R/W access to a local filesystem and shared memory in the pocket rocket. Using DLDI, we can easily manipulate anything we put onto a flash cart. Many flash carts exist, such as the M3, R4, ACESuperCard and CycloDS. Some of the more advanced carts such as the Cyclo series support automatic DLDI, in that you don't need to load patches or install the DLDI loader in order to use the majority of homebrew applications. The ability to read and write into any memory space also opens up other possibilities, inasmuch as we can run entirely different operating systems on the NDS. DSLinux (**http://www.dslinux.org/**) is a prime example.

This of course is only the tip of the iceberg. We've already seen other tools and emulators eventuate for the device, such as SNemulDS (SNES emulator for DS) and SCUMMvm DS. We expect Nintendo 64 emulation/capability shortly.

PSP Homebrew

PSP homebrew had a strange start to life. The first exploit for the system wasn't discovered through buffer overflows or unsigned code execution, but through a game with some slightly lax network security. *WipeOut Pure* allowed the end user (with a little bit of imagination) to spawn a web browser and then navigate practically anywhere on the PSP's filesystem. This in itself allowed us to 'see' for the first time the UMD format structure, as well as the native bootloader the PSP used, EBOOT. Once the EBOOT binary (EBOOT.bin) was extracted from the *WipeOut Pure* UMD, it was loaded onto a memory stick, made executable, then run atop some demo code (a simple 'Hello World' style application). Because Sony's PSP v1.0 firmware had no code signing checks, this unsigned code ran without problems. The PSP brew was then available on tap.



Sony's PSP battery being converted to run in service mode, via lifting the 5th pin on the secondary IC.

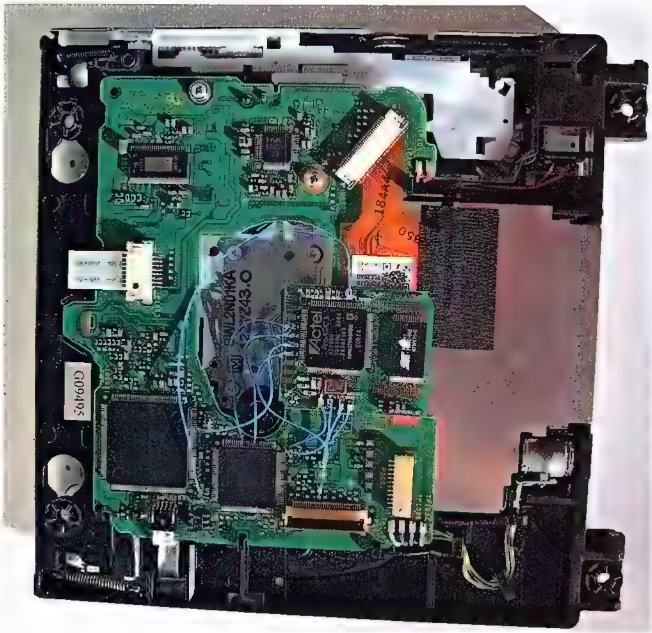
As of firmware 1.50, there were two obvious ways to run homebrew. One was through Swaploit and one was through the now infamous KXploit. The Swaploit was phased out fairly quickly as it was unsafe, in favour of the KXploit. None of this went unnoticed however. On June 25th 2005, Sony released its 2.0x series firmware. As expected, nobody wanted to update their fully customised/hacked/modified PSP's, as the 2.0x firmware implemented code signing. Sony realised people would not want to upgrade for this reason, so they gave them some wonderful incentives. Sony released a full web browser and HTML parser for PSP. Was it enough to stop the modders? No. What followed was a game of cat and mouse, most of which involved the now beloved TIFF-based image binary exploits in order to 'crash' the PSP into a vulnerable state for unsigned code to run.

As time progressed, the 3.0 firmware made an appearance. Again, ways were found to run some favoured ScummVM, browsers... even abandon ware/ROM's from other consoles, one of the best known being Daedalus, the Nintendo 64 emulator for PSP!

More and more effort has been put into porting every possible environment and engine to the PSP. MAME, Neo Geo Pocket, NES, SNES, Sega Saturn, Wonderswan et al were all cross-ported to PSP for abandoned/retro gaming pleasure. It hasn't stopped there however, with a host of productivity software still being written for the system.

This, however, is where it all gets sad. As of firmware v3.51+, we have no known methods of running homebrew or unsigned code on the PSP without physical persuasion. What, then, is required to run a homebrew app on your shiny new PSP or PSP-Slim with v3.51+ firmware? Pandora's Battery.

A Pandora's Battery is a PSP battery that has the first logical byte offset in EEPROM set to 0xFFFFFFFF. When the PSP initialises with this EEPROM value implanted on the battery, the



Matshita Wii D2C chipset patched with Wasabi drive chip.

service/diagnostic mode of the PSP is entered. From the service mode (think of it like safe mode, for the NT kernel!), driver signing, let alone code signing, isn't taking place. It doesn't matter what firmware you are running at this point. You can do what you like. This is as much a physical mod as it is a software mod.

Of course, if you don't feel like destroying your PSP battery, there is an easier way to put a PSP with v3.51+ firmware into recovery/service mode. Datel provide a pre-modified battery for just such a task.

Wii Homebrew

With the slow but sure decline of the original Xbox scene, the Wii scene seems to be picking up where it left off. The initial efforts to start Wii brew were slow to start and the general development process has not been much faster. This was hampered in many ways by WiiOS and the nature of Nintendo's new memory protection methodology.

A few months ago, some enterprising folks over at *wiibrew.org* employed a simple stack-smash (this falls under a software exploit category) to allow the running of unsigned or arbitrary code. A stack-smash in its most simple form involves writing to memory addresses within an executable environment outside of the intended data structure of programmatic constraints. Here's a trivial C-style example:

```
voidnaughtyVariable (char *suspectVariable)
{
  char  c[12];
  strcpy(c, suspectVariable);
}

int main (intargc, char **argv)
{
  naughtyVariable(argv[1]);
}
```

The big problem here is that we've just written (or string copied) the contents of the suspectVariable into a char of size 12, without actually knowing how big the variable was. Boom! We've crashed the stack!

The Wii chainloader stack smash was triggered by choosing an extremely long name for your horse, Epona, in *Zelda: Twilight Princess*. This then allowed the user to 'crash' the game, but keep the core innards of WiiOS running, and thus execute their own code on the runtime stack.

With the use of the chainloader, we can then load any ELF (executable and linking format – a term originally coined by Amiga!) binary we wish. It has

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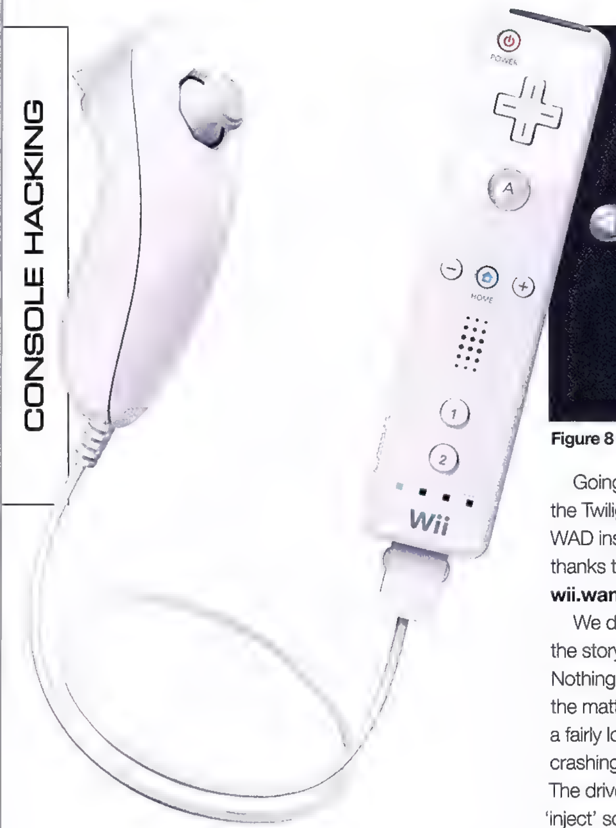


pretty much blown the Wii scene wide open. A new example of the current homebrew working is the 'all in one emulator'.

A Linux distribution has also been ported, temporarily known as the 'PoCWii Linux' or proof of concept Linux. It is freely available for public consumption here: **http://wiibrew.org/index.php?title=Wii_Proof_of_Concept_Linux**

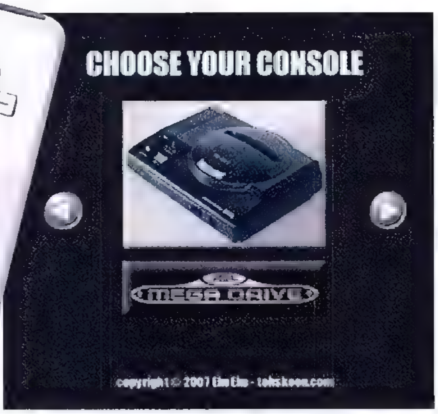


Figure 8 – The Wii all in one homebrew emulator.

Going beyond rudimentary ELF files booted from the Twilight hack, we also now have fully-integrated WAD installers/uninstallers and target manipulators thanks to the Wii programmer Waninkoko (**http://wii.waninkoko.info/**).

We don't want to give you the impression that the story of Wii brew/hacking is complete, though. Nothing could be further from the truth! The fact of the matter is, really getting into the guts of WiiOS is a fairly long-off concept. So far, we have our stack-crashing capability and our 'drive mod' functions. The drive mod itself serves only as a means to 'inject' some additional information into the MMC/SCSI layer, allowing the Wii to recognise and spin up DVD recordable media.

While this is handy for backup purposes, it really hasn't let us explore the inner sanctum of the WiiOS as yet. With time and concentrated efforts, we may be able to gain total control over WiiOS, and within that, create our own pre-boot environment and totally change the Wii for our own brew needs. Think – rather than crashing the Wii then loading a media centre channel, we'll be able to boot the Wii INTO the media centre channel from first principles! Wiimedia is one such project with this idea in mind.

Xbox 360 Homebrew

The drive-flash firmware for the internal DVD drive remains the sole hack for the Xbox 360. The Xbox 360 uses a non-transparent hypervisor that has prevented any direct access to the hardware for arbitrary code so far. We've not gotten to the point where we can dig through this layer to manipulate anything under the hood. The issue thus far is the impossibly long cryptographic checksum used within the hypervisor. We don't know or have a practical way of calculating keys, nor do we have a way to inject things below the hypervisor. In time, we may see some action!

For the time being, we need to be content with drive-flashing for backup media loading. This can be achieved via direct firmware flashing of the (predominantly) Hitachi-based drive/controller, a dedicated drive chip or 'hot-swapping' media.

The most comprehensive guide we've come across for low level firmware flashing is on xbox-scene: **http://forums.xbox-scene.com/index.php?showtopic=514944**

PS3 Homebrew

The Sony PS3 has another complicated hypervisor as a primary defence against the would-be hacker having their way with the hardware. Thus far, only cursory attempts of 'hacking around' the hypervisor have been made, but as we will see later, more is coming to light every day about the nature of this specific hypervisor technology. Again, the PS3 is proving to be a testament to both Sony and Microsoft's dedication in keeping their console's locked up fairly tightly.

Super Nintendo and Famicom 50-60Hz switch.

Going retro style

We've covered the new consoles here. The PS3, Wii, DS Lite, PSP and Xbox 360 are the current big-hitters, but what came before all of this? The console modding scene for 'retro mods' is alive and well.

The Super Nintendo was subject to some wonderful modifications in its lifetime. The majority of these were 50/60Hz flipper switches and 'world capable' playback options.

People became more adventurous as time went on. RGB connectors were added to the SNES in an effort to keep the good retro times rolling on newer LCD and CRT monitors. Here, we have a solder guide for attaching an RGB/D-SUB output to your SNES: **http://www.mmmonkey.co.uk/console/nintendo/pal-snes-rgb.htm**

Sega's Master-System II still enjoys its fair share of the fun also, with a common modification being the addition of an A/V (composite) and S-Video output: **http://www.mmmonkey.co.uk/console/sega/sms2-av.htm**

> Ultimately, the retro mods are just a 'fun' thing. The truth is we really don't need our old consoles to play our old games.

Things have gone a step further again with 'full conversion' mods that essentially change the nature and shape of the console itself. Such examples include the now famous coin-operated PS2 and the Flight-Simulator Dreamcast Chair.

Ultimately, the retro mods are just a 'fun' thing. With the advent of technologies such as Virtual Console (VC) for Nintendo's Wii and emulation engine homebrew for just about every platform, the truth is, we don't really need our old consoles to play our old games.

The dark path ahead – Hypervisor hacking

Things are about to get heavy. Hold on. Remember we mentioned a little earlier that the hypervisor technology used on the Xbox 360 and PS3 are yet to have been cracked? Well, there are efforts underway to understand these hypervisors in more depth, as a means to potentially exploit them. We'll take you on a road trip through the PS3 hypervisor (or what we know so far) at an API level.

So far, there are a few known things we can do to talk to the hardware that is below our arbitrated layer through what Sony simply tagged as 'otherOS.bld'. In its most simple form, we can run a Cell-compiled Linux kernel atop the PS3. The most popular of these distributions is currently PSUbuntu, a Cell derivative Ubuntu distribution.

A great guide for simple installation can be found on the official site for PSUbuntu: **http://psubuntu.com/wiki/InstallationInstructions/**

With this installed, and nothing more than a terminal, we can use memory/register and API tracing functions to 'see' what is going on behind the curtain. We can use several different means to 'see' this stuff. Our personal preference is the GDB or GNU Project Debugger. Installation files and binaries can be downloaded here: **http://sourceware.org/gdb/**

Once the GDB module is installed (we won't go into detail here, refer to the sourceware link for instructions) we can start to pull commands out of the PS3. Fire up a terminal window, drop to the root user and we'll start making some system calls!

We decided to generate some simple I/O operations as follows:

With gdb running alongside, we can 'catch' the calls being made (yes, real system call hacking and tracing folks!). So far (and this is a non-exhaustive list), we can see:

```
zPS3:~ zebra$ gdb -k
(gdb) lv1_allocate_memory
(gdb) lv1_allocate_memory
(gdb) lv1_storage_write
(gdb) lv1_storage_get_async_
  status
(gdb) lv1_storage_check_async_
  status
```

Within this, we can tell what processes and what functions are being called from below the hypervisor by a modular debug of each of these lv1 system calls.

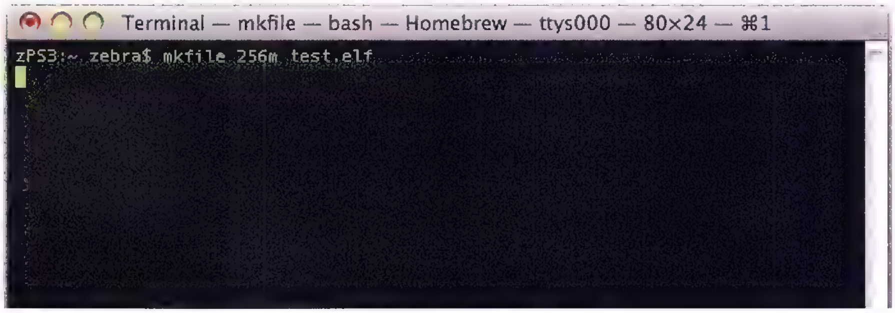
So, we've made some progress there, even if it isn't much. We can see how our actions are affecting the hardware down below. We do know from Sony's own documentation that there are significant limitations placed upon the PS3 for our 'userland' usage:

1. Access to RSX (the nVidia GPU) is completely blocked.
2. Access to the Emotion Engine (PS2 emulation environment) is blocked.
3. Access to SPE's is limited to six discrete cores. This is done for a multitude of reasons.
4. The hard disk is limited to only a small portion that is abstracted to the 'Other OS'.

Recent homebrew efforts have allowed us to unlock 256MB of the RSX module's lower speed DDR memory. Thus far, we haven't been able to actually use the GPU, however. All the efforts made at documenting each system level 1 call have been placed on a wiki here: **http://wiki.ps2dev.org/ps3**

The result is us being able to at least guess at what is happening, even if we can't yet control the hardware as our own. In the coming months, we hope to find a way through the hypervisor via undocumented system calls. Hopefully these undocumented calls will provide us a way to 'push' the hypervisor out of the way. Traditionally, hypervisor to hardware level abstraction such as those found in VMWare's ESX Server or Sun's LDOM are tough as nails and are yet to show signs of obvious exploitation. Breaking out of a virtualised environment might be the last great battle.

We hope you've enjoyed this romp through the integrated circuit forest. We'd like to think it's given you something to think about, maybe something to explore further, and has armed you with the ability to take that first inspirational step in hardware hacking. You know you want to. After all, you are an Atomican, right?



```
zPS3:~ zebra$ mkfile 256m test.elf
```

Figure 11 – Generating disk IO time through the mkfile command on the PS3.

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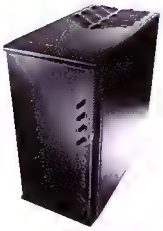

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HARDCORE

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NEWS, REVIEWS AND ROUNDUPS ON THE LATEST HARDWARE

There's a little bit of something for everyone in this month's hardcore, and the entire team has pitched in to throw some gear your way.

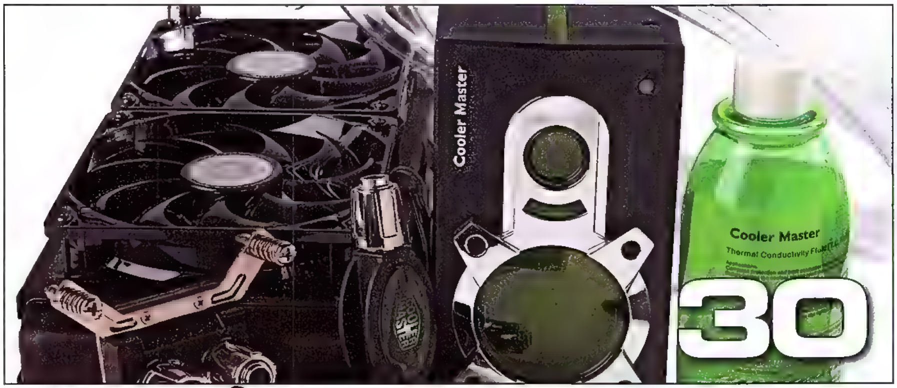
Josh takes the biggest load on his wide, manly shoulders this month, pumping out the numbers on a range of mobos from ASUS. Not content to rest there, on he goes to handle the latest Phenom, XFX's newest graphics monster, a mess of RAM and some driving accessories that will leave the Top Gear fans amongst your drooling. Vroom!

David Field gets his geek on with the fastest hard drive he's had the pleasure to platter, and a new ATI card that he's been grinning at all month.

Finally, there's a PC case and a couple of gaming laptop reviews from David Hollingworth.

And we've not even mentioned all the usual swag in kitlog, our round-up of out-of-the-box water-cooling solutions, or Dan Rutter's column.

Stuff. We've got it.



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Alpha Power Battery Charger

Price $US79.95 **Website** www.lacrossetechnology.com

Living the high-gadget lifestyle is fun and undoubtedly handy, but it comes at a price. Batteries, and lots of them, are the price we pay for having a little tech toy for every occasion, and unless you're hip to the rechargeable lifestyle, they can cost you a pretty penny.

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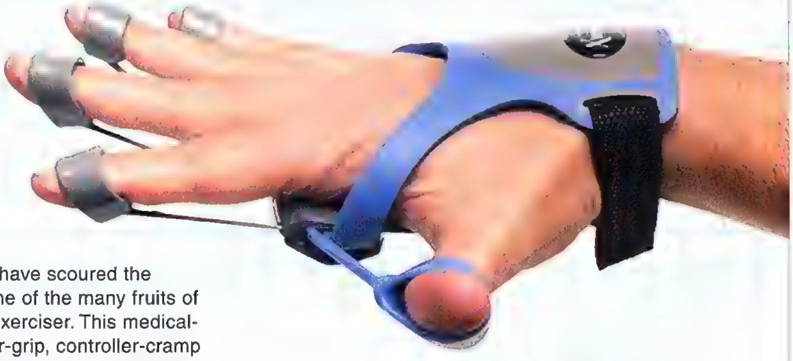
Well, the Alpha, from Lacross Technology, ticks just about every box for the battery-addicted modern geek. The charger works with all NiCd and NiMH AA and AAA Rechargeable Batteries, features overheat protection to stop batteries from overcharging, and has an LCD display to let you know how your charging is coming along.



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Price $US39.99 **Website** www.lifesolutionsplus.com

Being a gamer isn't all frags and achievements. Along with the adoration and kudos comes a lot of pain and torment. For each win, there may be a defeat. For every headshot, there may be hours of hand cramp.

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Sometimes you need a little helping hand to perk you up in the morning, or to give you that extra edge in a deathmatch. There are many ways to gain this edge, but for most, caffeine is the drug of choice.

While a steaming hot cup of Joe might be the traditional method, sometimes making a pot of coffee is simply off the cards – like in the aforementioned deathmatch. Worry not, caffeine addict, as PC Case Gear has come to the rescue, with its Javapops range of caffeinated lollipops. Available in French Vanilla, Irish Creme, Cappuccino and Chocolate Raspberry flavours, each candy contains a useful 60mg of caffeine – up there with a good coffee and a lot easier to prepare. Get sucking!

GIGABYTE GK-K8000 Pro Gaming Keyboard

Price $TBC **Website** www.gigabyte.com.au

We're not above the occasional bit of fancy keyboard action, and have been known to drool at models from Logitech and have gawped in amazement at the brilliant Optimus Maximus OLED keyboard.

But we never thought we'd be excited by a GIGABYTE gamers' keyboard. And, yet, here we are, quite impressed.

The GIGABYTE GK-K8000 is a professional gamers' keyboard, and it eschews the often garish colours and questionable design choice that so many 'gaming' style devices sport. It's a deceptively plain keyboard, in dark grey, with few highlights apart from some asymmetric angles and grooves.

The big pull is in the keyboard's mechanical keys, which promise a smoother, more reliable action in both short term play and long-term reliability. The kit even comes with a key changer, a mess of contrasting keys to highlight essential gaming functions and macro software so you can set up and store 103 gaming profiles on the built in GHOST Engine. It's a serious keyboard, in both looks and features. We like.

N Ultra Rangeplus Wireless-N Broadband Router ▲

Price $169.95 **Website** www.linksys.com

The backbone of any modern home is its wireless network. These days, the kind of connectivity our oldies could only dream of is second nature, and it's hardware like this that has made such a dream come true.

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WET AND WILD

Josh Collins tosses out the fans and upgrades to something a little heavier in the search for ultimate PC cooling.

Last month we sussed out the good, average and the epically horrendous in the air cooling world. It's a known fact that our little silicon buddies need to keep cool to assure we get our gaming, programming or Atomic forum fix. But what if even air cooling isn't enough? What if you want the speed provided by overclocking but can't bear to see Core-Temp reporting that your CPU is about to go Pompeii on your arse? Or, if you're like us and a 'mild' overclock just isn't good enough – you want more!

Having outgrown the realms of air based cooling solutions, the next logical step is to hit that booster button and check out water cooling.

Now, we've covered this topic quite a bit over the years. We've looked at the theory behind the need, the theory behind the installation, the theory even behind the construction of some of the parts such as water blocks; we've even covered the practical side of putting a water cooling loop together. But it's time we take a gander at the pre-built systems available on the market.

This month we've taken a selection of some of the most popular pre-built solutions and put them to the test. We're looking to find out just how good these units are. Especially interesting is just how far these pre-built systems have come since the just-good-enough systems of the past which were, on occasion, worse than the high-end air cooling solutions.

The challenge is set, the results are in from last month's air-based heatsinks and now it's time for the pre-built water cooling loops to prove their worth.

Testing Methodology

TESTING HARDWARE

Test System:
Intel Core 2 Extreme QX6850 G0 stepping @ 3GHz
EVGA 680i SLI motherboard
Corsair Dominator PC2-10000 C5 memory
ASUS 8800GTX graphics card
Vista Ultimate 64-bit operating system

Temperature recording methods:
Software:
Temperature reading: CoreTemp 0.97.1
Load simulation: Prime95 v25.6
Hardware: K-Type Digital Thermometer and K-Type Temperature Probe

Coolant
Demineralised water

A fair fight is a good fight.

With this mantra in mind, the testing methodology behind this roundup will be the same as was used for last month's air-based heatsink shootout.

This means for our testing we'll be using a 65nm Intel quad core processor, as we believe this to be the best indication of the cooling capacity of current coolers in the majority of enthusiast systems. The system is set to run and operate with the CPU at 3GHz and has a set vcore of 1.30v.

To recap for anyone who missed last issue (quick, if you hurry to the newsagent, you might still be able to get a copy of issue 89!), we discussed the issues surrounding the testing of heatsinks in general. These include:

- Variable ambient temperatures.
- Probe accuracy.
- Overall test area airflow.
- Airflow designs (high CFM vs low CFM heatsink designs).

Some of these issues are no longer an influence on our testing – for example, the influence of different airflow designs on results and the probe accuracy, seeing as we are well within the K-type probe spectrum. We avoid the fluctuating ambient air temperature by conducting the tests in our emptied out warehouse rather than the labs. The reasoning behind this choice is that the ambient air temperature in the labs fluctuates dramatically depending on the hardware being tested. On the flip side, the warehouse has a large body of air that is much more difficult to heat and thus directly influence ambient air temperature.

But none the less, even after we manage to rid the test system of past issues, a whole new convoy arrives and with it, twice as many issues.

Due to the complexity of a water cooling loop, at least relative to an air-based solution, there is a greater number of potential issues. Some of these new issues include:

- Differing flow rates due to pumps used.
- Differing flow rates due to different sized tubing.
- Differing levels of pressure due to different pumps.
- Differing internal water block design and construction influencing both coolant flow and heat dissipation.
- Differing radiator sizes influencing heat dissipation effectiveness and efficiency.

To put things into perspective for the testing, these differences can be stricken from the record

CUSTOM LOOPS VS KIT LOOPS

An argument often had between the aficionados and newcomers to the cooling field is the old chestnut of DIY, or custom, loops vs kit or pre-built loops.

It has been proven time and again within the enthusiast circles that a custom loop will ultimately defeat a pre-built loop.

This is because, with a custom loop, you have the ability to combine different products from different manufacturers so to achieve the best performance in every category. While this will result in the ultimate performance, as well as giving the user room for potential system growth in the future, it also means a prior knowledge of both vendors and part characteristics is necessary.

This is essentially why a kit or pre-built market exists. Not everyone is born with a complete water cooling knowledge bank or an understanding for the positive and negatives particular parts can give to a cooling system.

So, for these reasons we'll note here and now that it is, in most cases, extremely likely that a custom loop will always beat a pre-built kit, but it does not mean these kits are frowned upon. These kits are a great way to introduce new enthusiast-grade users to the water cooling market.

ETHYLENE GLYCOL VS PROPYLENE GLYCOL

A very important aspect of the coolants used in a water cooling loop is the chemical base used to create the coolant as well as any additives.

While additives can influence the coolant's characteristics in terms of corrosion inhibiting capability, thermal transfer rates, anti-algae properties as well as boiling and freezing points of the liquid, there is often one very important aspect overlooked – whether or not the liquid is deemed poisonous to humans.

Unfortunately a very common base found in coolants used in PC water cooling loops – often taken directly from implementations in automotive engine cooling systems – is ethylene glycol.

This coolant is best left to the automotive scene and avoided by the average PC water cooling enthusiast.

On the flip side, a non-poisonous solution with similar properties to ethylene glycol is called propylene glycol and quite often a coolant will use either one or the other as its base.

While the thermal characteristics of each are very similar and thus does not impact cooling capability within the temperature ranges of the average PC water implementation, the use of ethylene glycol would only be proposed as a 'better idea' if going into sub-ambient temperatures.

If you prefer not to work with poisonous substances within your water cooling loop, do some research prior to purchasing the kit and/or check the coolant bottle labelling for information on which base is used. If no information is available, and you're unsure, it may be best to simply purchase some coolant that meets your exact requirements.

with a single statement.

So what's this statement got to say? Well, we mentioned that we were comparing pre-built water cooling kits. This means that we're fully expecting differences to occur such as pump head and flow rate, tube sizing, water block designs etc. This is an apples-to-apples comparison of pre-built kits, not a comparison of what the best components are for a DIY solution. Therefore we expect to compare different takes on a single idea to eventually find the king of the hill.

To assure a level field for competition, the coolant used in the kits was demineralised water rather than the supplied solutions. For the curious, you can get this at most large supermarkets, usually in the cleaning goods section. Oh, and don't drink the stuff, as it can come from all manner of not-healthy sources. Ick.

Finally, we also include the results of last month's winning air-based solution in our results at the end of the feature, so you can get an idea of the performance increase (or lack thereof) these kits offer the enthusiast user.

With these clarifications made, let's get on to checking out the contenders of this Head2Head.

THANKS TO PC CASE GEAR

www.pccasegear.com

We'd like to take this opportunity to say thanks to our friends at PC Case Gear for giving their support to Atomic to conduct such a roundup.

Cheers to the PCCG crew; if you're wanting to check out some innovative ways to not only cool your CPU but also your GPU, motherboard chipset and case airflow in general, take a trip to their website and have a squiz.

THE GALVANIC CELL EXPERIENCE

For those of you who did or are doing Chemistry at school and can still remember the galvanic cell, you're one-up on the rest of the crowd… at least up until this point.

It's time for the rest of you to catch up!

The galvanic cell, in its simplest state, is two metals from differing ends of the periodic table interacting through a salt-bridge.

For water cooling units, this means two metals within the components used in the loops, interacting through the coolant running throughout the loop.

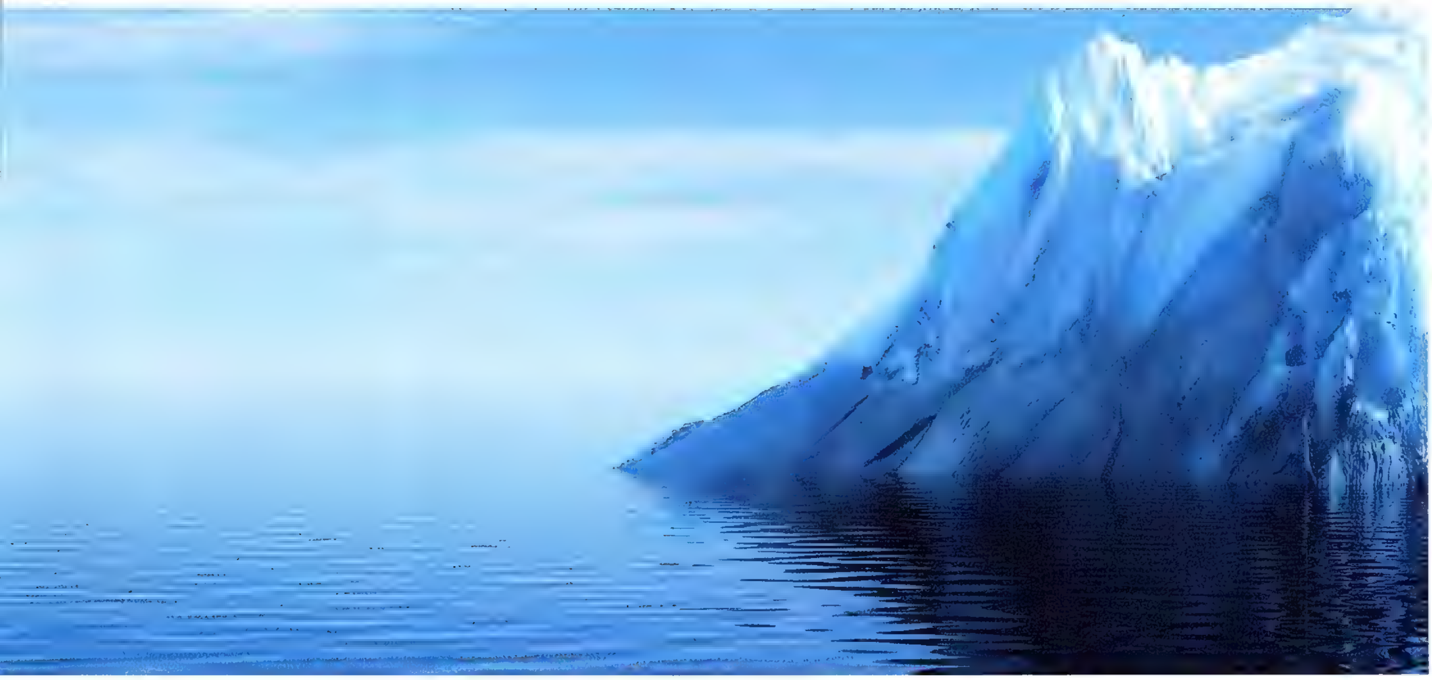
The galvanic cell is the reason why enthusiast will always warn others against using metal combinations such as copper and aluminium in the same loop as the copper will experience corrosion due to the chemical reaction and the aluminium will build up chemical deposits upon it.

Metals from the same end of the periodic table, for example copper, brass and nickel, are fine to be used within the same water cooling loop as they are inert towards one another and will not form a galvanic cell.

Other taboo combinations, besides copper and aluminium, include any metals such as copper, brass and nickel being used in the same loop as zinc.

For further information on the galvanic cell, either give your science teacher a thrill by appearing interested or use the wonder that is the world wide web and check out information using your own Google-fu.

NOTE: The galvanic cell is not to be confused with an electrolytic cell.



Swiftech H2O-220

Price **$245;** Tube dimensions **3/8in;** Materials **Copper (water block), Brass tubes and body/Copper fins (radiator);** Pump head **3m;** Pump flow rate **300 L/H;** Pump MTBF **50,000 hrs;** Radiator size **240mm ('double');** Fan CFM **81.3;** Fan Noise **36-39 dB(A);** Fan RPM **2000;** Socket compatibility **Sockets LGA775, 754, 939, 940, F, AM2/+.**

The runner up in this Head2Head, the Swiftech H2O-220 is an expanded version of the earlier released H2O-120.

Now featuring a 240mm radiator, or 'double radiator' as it is more commonly referred to in water cooling circles, the Swiftech H2O-220 is equipped to handle a larger heat capacity. This means the kit has the potential to expand from the current cooling solution of simply cooling the CPU to potentially incorporating other parts of the system such as the GPU and/or chipset.

Like its smaller yet older sibling, the H2O-220 water cooling system incorporates a pump similar to the MCP-350, also available from Swiftech, into an all-in-one solution with the CPU block.

This coming together of two components to create a single part within the loop naturally has both a positive and negative impact on performance. On the positive side of the fence, the loop as a whole and the individual components now take up a much smaller foot print when installed in your system. It's no longer necessary to find a suitable space and orientation to place the pump within the case; it simply sits on top of the CPU water block. On the other hand, this spatially elegant solution does not translate to an overly elegant thermal one.

It is a well known fact among water cooling enthusiasts and aficionados that any pump, or series of pumps, within a water cooling loop will have a heat-dump effect within the cooling system. This is one reason why it is very common to place the pump before the radiator in a DIY system.

While this factor may be deemed insignificant enough by Swiftech for the product to be taken to market, it could be seen as the reason for the temperature differences between the H2O-220 and very similarly specced Coolermaster Aquagate Max. Trailing by just 0.25°C at idle, this blows out to a difference of 3.5°C when the system is placed under load.

While 3.5°C may seem insignificant, when you consider that the Thermaltake Big Water 760i is only 2.25°C behind the H2O-220 under load conditions and is a smaller form factor, you can't help but wonder why Swiftech has built its kit this way.

Also worth noting is the fact that the coolant uses ethylene glycol based coolant. This particular coolant base is poisonous to humans and is best avoided if possible.

Swiftech H2O-120

Price **$159;** Tube dimensions **3/8in;** Materials **Copper (water block), Brass tubes and body/Copper fins (radiator);** Pump head **3m;** Pump flow rate **300 L/H;** Pump MTBF **50,000 hrs;** Radiator size **120mm ('single');** Fan CFM **81.3;** Fan Noise **36-39 dB(A)**; Fan RPM **2000;** Socket compatibility **Sockets LGA775, 754, 939, 940, F, AM2/+**

Smaller in size, but older in age, the H2O-120 was the first of the two Swiftech kits in this Head2Head to make an appearance on the market.

Like its larger-sized sibling, the H2O-120 uses all copper parts within the block and radiator as well as some brass parts in the radiator. This makes avoiding a galvanic cell that much easier.

Despite carrying the well-known and respected badge of Swiftech, this kit manages to fall behind one of the kits from competitor Thermaltake. If you're not in the water cooling enthusiast loop (pun unintended), Thermaltake is often referred to as the chubby kid in the line up who always gets picked last in schoolyard games of soccer.

With its tail between its knees, the Swiftech H2O-120 still manages a reasonable result by being ahead of last month's air-based solutions and beating the Thermaltake Big Water 780e kit.

Like its larger brethren, it could be contested that the all-in-one solution of the pump and CPU water block is at the heart of the cooling hindrance in this kit. With only a single 120mm radiator to cool the loop, the heat dump of the pump combined with the high waste heat of today's quad core processors could very well be too much to merit the asking price of $159, especially for a unit only ever so slightly better than a $70+ cheaper air based solution.

With a single radiator, the H2O-120 is very restricted in any future growth. Any increase in parts requiring cooling from this loop could only ever be met by an increase in cooling capacity. This in turn means larger radiators and could also result in the need for an increase in pump head and flow rate. As a result, buying into this kit means you're buying into CPU cooling solution only, not one that can be expanded to include, within acceptable thermal boundaries, any other parts of the systems such as GPUs, Chipset, MOSFETs and so on.

The only real appeal in this unit is to gain access to the bragging rights attached to water cooling. At the end of the day, this system's results, as well as those from the Big Water 780e, only demonstrates just how far air based cooling has come in closing the gap between it and water cooling.

Being the predecessors to the H2O-220, the H2O-120 also uses ethylene glycol based coolant, which is best avoided if possible for the reasons we've mentioned.

Coolermaster Aquagate Max

Price **$235;** Tube dimensions **3/8in;** Materials **Copper (water block), Aluminium (radiator);** Pump head **2m;** Pump flow rate **450 L/H (max);** Pump MTBF **50,000 hrs;** Radiator size **240mm ('double');** Fan CFM **71.81;** Fan Noise **22 dB(A);** Fan RPM **850-2400;** Socket compatibility **Sockets LGA775, 754, 939, 940, F, AM2/+**

Queue the round of applause.

Up against some fairly stiff competition, the Aquagate Max – from the folks at Coolermaster – has managed to snatch victory with an idle temperature of 29.25°C and a load temperature of 40.25°C.

The results from this Head2Head has certainly shown Coolermaster's Aquagate Max to be a strong cooling solution and it does so against some well-established competition.

With an asking price $10 cheaper than the next best kit and load temperatures 3.5°C lower, the Aquagate Max appears quite attractive. Featuring a wide compatibility list for all and sundry, the kit also looks the goods to boot.

Despite this kit earning so much praise, there are some areas that concern us, and do offset the kit's otherwise great performance.

One such relates to the coolant used. We've mentioned, for the other kits in this roundup, whether the coolant is ethylene glycol or propylene glycol based. We'd love to inform everyone of the coolant bundled in this kit but unfortunately we weren't able to find out whether it was ethylene glycol or propylene glycol.

This is specified by Swiftech and Thermaltake on the respective website and/or bottle of coolant (either pre-mixed of unmixed). Conversely, Coolermaster does not specify this information anywhere. It appears that we, as the end users, are meant to just not care.

On the coolant bottle, the label simply states a glycol base. This alone is uncomforting but add to it the fact that the Aquagate Max's predecessor, the Aquagate Mini, used ethylene glycol based coolant, we can't help but feel that Coolermaster may be trying to pull the wool over our eyes – we certainly hope not.

If you're not feeling confident in the coolant supplied, you can use a number of solutions commonly used by enthusiasts, such as straight demineralised water or deionised water, or could also look at solutions such as demineralised water and pentosan 11 – a very popular mix due to the anti-freeze and anti-corrosion properties paired with an attractive blue colouring.

Our second gripe with this system is that the kit uses a copper-based water block paired with an aluminium radiator – this is simply asking for trouble. With optimum metals in place for a galvanic cell, a heavy duty anti-corrosion additive is a must-have to be used with this kit. For some, this advice may not be sufficient to put to sleep the worries of corrosion and with stories abounding on enthusiast forums of such solutions not being effective, it even leaves us uneasy.

Thermaltake Big Water 760i

Price **$199;** Tube dimensions **3/8in;** Materials **Copper (water block), Aluminium (radiator);** Pump head **N/A;** Pump flow rate **500 L/H;** Pump MTBF **80,000hrs;** Radiator size **120mm ('single');** Fan CFM **N/A;** Fan Noise **16-20 dB(A);** Fan RPM **1600-2400;** Socket compatibility **Sockets 478, LGA775, 754, 939, 940, F, AM2/+**

Hitting through the thermal benchmarks with something to prove, the Thermaltake Big Water 760i certainly left an impression. Beating long time water cooling kit rival Swiftech in the single 120mm radiator size division, the 760i could be said to be a call for a changing of the guard.

While the results have been surprising, and rather interesting all over, the kits themselves also manage to give just as much controversy and areas for discussion.

For example, like its brethren the Big Water 780e and the Coolermaster Aquagate Max, the Big Water 760i utilises a copper based CPU water block paired with an aluminium radiator.

This combination raises great concerns for the creation of a galvanic cell. Such chemical cells can create catastrophic situations in a water cooling system over time. The first of many signs is a white discolouration within the coolant (sometimes difficult to spot with coloured coolants) and the next most notable change is an increase in load temperatures. This can then move onwards to exhibit excessively high load temperatures while showing relatively normal idle temperatures.

If a coolant flush (removing all coolant and then running a pressurised one-time-through loop of demineralised water) leads to small clumps of white salty substances coming through, you'd best find a teddy and cuddle it while you pull apart your loop. This is because you could have a white-mess of corrosion-ravaged copper, generally the water block, and a much thicker, layered white-mess on the aluminium, often the radiator. This results in low thermal transfer on the copper water block and high flow impedance within the aluminium radiator. This renders a rather diminished cooling experience.

The 760i also sports an ethylene glycol based coolant which, as has been explained in the ethylene glycol vs propylene glycol boxout, is not the glycol you want to be dealing with when filling, bleeding or emptying your loop.

Additionally, with a price tag a dollar shy of $200, the 760i is $40 more expensive than its single 120mm radiator competition and only $36 less than the thermal leader, the Coolermaster Aquagate Max. If considering this unit, it's important to question whether the 3.75°C load temperature difference is worth $30 or whether it might be worth spending the extra to see a 5.75°C drop in temperatures from the 760i performance.

As with many computer components, the ability to balance positives and negatives for the best solution is often a tricky one and filled the compromised. On this premise, while the Big Water 760i does perform well for its form factor, it also has a number of niggling issues.

Thermaltake Big Water 780e

Price **TBA;** Tube dimensions **3/8in;** Materials **Copper (water block), Aluminium (radiator);** Pump head **N/A** Pump flow rate **500 L/H;** Pump MTBF **80,000hrs;** Radiator size **120mm ('single');** Fan CFM **N/A** Fan Noise **10-20 dB(A);** Fan RPM **800-2500;** Socket compatibility **Sockets 478, LGA775, 754, 939, 940, F, AM2/+**

The Thermaltake Big Water 780e has the, um, 'privilege', of getting the Atomic wooden spoon award. Not an epic fail like the horrendous results from the Scythe Ninja Mini, but the Big Water 780e was nonetheless uninspiring.

Coming in last by a convincing 2.75°C from its closest rival and 9.5°C behind the Head2Head thermal results leader, the 780e has some serious improvements to make.

While a price was unavailable at the time of writing due to the kit's fairly recent release, we have a feeling this system has the potential to come in with a price point north of its 760i brethren's asking price and possibly even that of the double radiator solutions from Coolermaster and Swiftech.

One feature we see as being a possibility for an increased price point is the inclusion of ESA standard compatibility.

While, as we covered in issue 88, we do approve of the ESA standard, we hope that any manufacturers and subsequent products or components that wish to adhere to the ESA standard do not then need to increase prices, at least in a flamboyant fashion, to meet these needs. Especially as only those with a 7-series NVIDIA motherboard can currently take advantage of this extra capability.

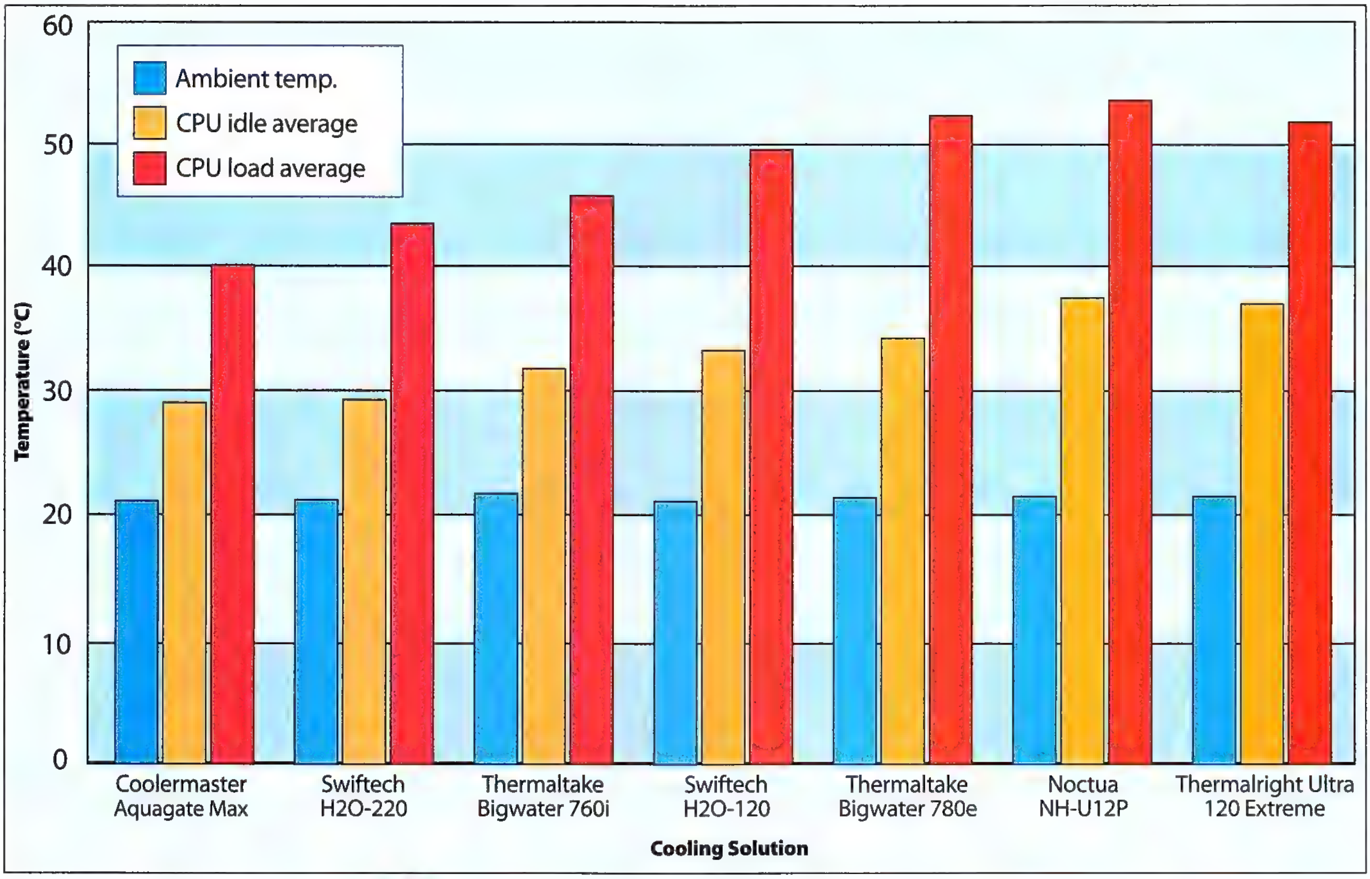
Like its Big Water 760i predecessor, the 780e includes both copper-based and aluminium-based components in the same cooling loop. We've said it over and over in this Head2Head but in case you've read this before any other part; avoid a galvanic cell if at all feasible.

Thankfully there is one glowing point of difference that we can highlight in a positive manner.

It uses the right coolant!

We've outlined the difference between ethylene glycol and propylene glycol but time and time again the manufacturers are choosing ethylene glycol in preference. Well, it appears that with the next product in the Big Water series of water cooling kits, Thermaltake will be leading the pack with a propylene glycol based coolant. We're stoked to see this change in the pre-built, kit water cooling solutions and hope that other manufacturers take note and follow suit.

Ultimately, we can only hope that with an Atomic wooden spoon Thermaltake can muster the ability to cook up a better product next time around.


60
50
40
30
20
10
0
Temperature (°C)
Ambient temp.
CPU idle average
CPU load average
Coolermaster Aquagate Max
Swiftech H2O-220
Thermaltake Bigwater 760i
Swiftech H2O-120
Thermaltake Bigwater 780e
Noctua NH-U12P
Thermalright Ultra 120 Extreme
Cooling Solution

ASUS Rampage Formula

Josh Collins watches as ASUS rinses and repeats.

SPECS

Price **$375**
Supplier **ASUS**
Website **www.asus.com**
Specifications **Socket 775; Intel X48 northbridge; ICH9R southbridge; ATX form factor; 2x PCIe x16; 2x PCI; 3x PCIe x1 (one dedicated to SupremeFX II audio); 1x EIDE; 6x SATA; 1600MHz FSB; DDR2-1200.**

Rampaging or hemorrhaging? That's what we're wondering about ASUS' current motherboard lineup and the focus isn't just shining, but beaming down on this Rampage Formula for both good and bad reasons.

Back in issue 83 we took a gander at the Maximus Formula. At the time the X38 chipset had just dropped on the scene and with it dual 16x electrical PCI-express slots. This was, ultimately, the board's main saving grace.

The Maximus Formula was slower than its P35-based Blitz Formula stablemate and during our testing exhibited some memory efficiency issues, while also demonstrating why the X38 chipset is more appropriately engineered and tuned for use with DDR3 memory.

So what's with this history lesson? The review is meant to be on the Rampage Formula, right?

Indeed it is, but there's a good reason for background. This is not only the fact that X38 and X48 are near identical, with the exception of some additional speed binning at Intel's end, but also that the Rampage Formula is nothing new. That's right; we've seen this board before.

The old saying "if it ain't broke, don't fix it" is a great one. But by the same token, and for the love of technology progression, please ASUS, don't just re-release an old product with a new name!

If you've got a copy of issue 83 in your collection, do yourself a favour and go grab it and open to page 55. Furthermore, and for those of you that don't have a copy of issue 83 on hand, click your way through to the product pages for the Rampage Formula and Maximus Formula on the ASUS website. Look closely – real closely.

The boards are about as identical as a supposedly different series can be. Same socket layout, same expansion slot layout, same I/O ports and layout… heck, everything is like a mirror image but with a different colour in some places – how original.

We wish we could stop here, but now click on through the ASUS website to the entry level X38-based P5E. Now look closely at all the boards. Yup, it's the same; only a few physical parts such as fan headers haven't been soldered onto the board.

Now comes the real kicker – you might want to gather with fellow geeks for either an over the top laugh or some mass rioting – the P5E can be flashed to a Maximus Formula and obtain all the BIOS features bar a few minor ones. The same features you pay through the roof for. Not content with that? Well why don't you then flash your Maximus Formula or your already flashed P5E to the Rampage Formula? Because guess what everyone, that's doable as well!

This is quite possibly the biggest demonstration of why excessively streamlined product differentiation and engineering can lead to a rather red face for the manufacturer in the eye of the consumer. This, enthusiast brothers and sisters, is a poor example of rinse and repeat.

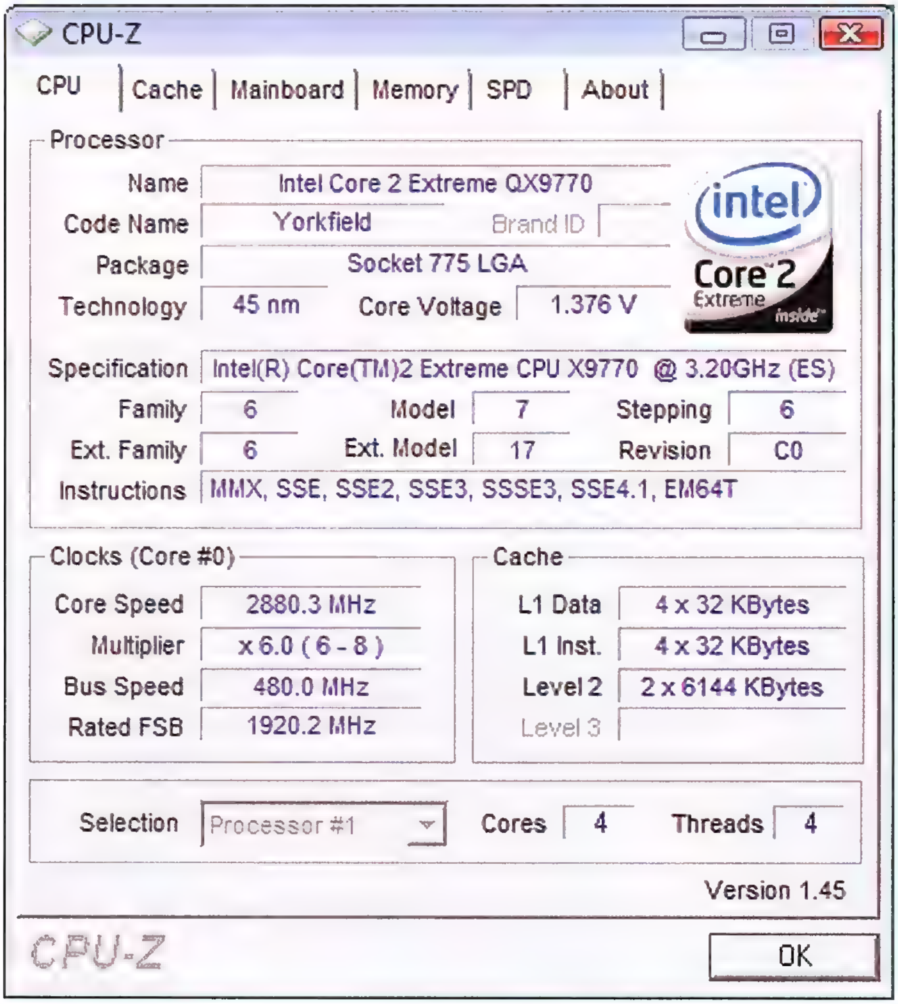
But enough harping on about how the boards are physically the same; what you undoubtedly want to know is whether they perform the same.

Annoyingly, the answer is 'more or less'.

You see, you'll get more in that the Rampage Formula motherboard/BIOS that we tested is overall faster than the results obtained for the Maximus Formula back in issue 83 – if only ever so slightly. But, if logic persists, this can be directly attributed to the now mature BIOS of the Maximus Formula and the R&D put into it prior to the release of the Rampage Formula. So, it must be asked; was any work really done to improve the Rampage Formula over the Maximus Formula? Or did it simply inherit already working and tweaked performance due to the 99.9 per cent similar characteristics?

Either way, we aren't entirely impressed. Sure, there's the fact the two boards are near identical

> “The boards are about as identical as a supposedly different series can be. Same socket layout, same slots...”



CPU-Z

Processor

Name: Intel Core 2 Extreme QX9770
Code Name: Yorkfield
Brand ID:
Package: Socket 775 LGA
Technology: 45 nm
Core Voltage: 1.376 V
Specification: Intel(R) Core(TM)2 Extreme CPU X9770 @ 3.20GHz (ES)
Family: 6
Model: 7
Stepping: 6
Ext. Family: 6
Ext. Model: 17
Revision: C0
Instructions: MMX, SSE, SSE2, SSE3, SSSE3, SSE4.1, EM64T

Clocks (Core #0)

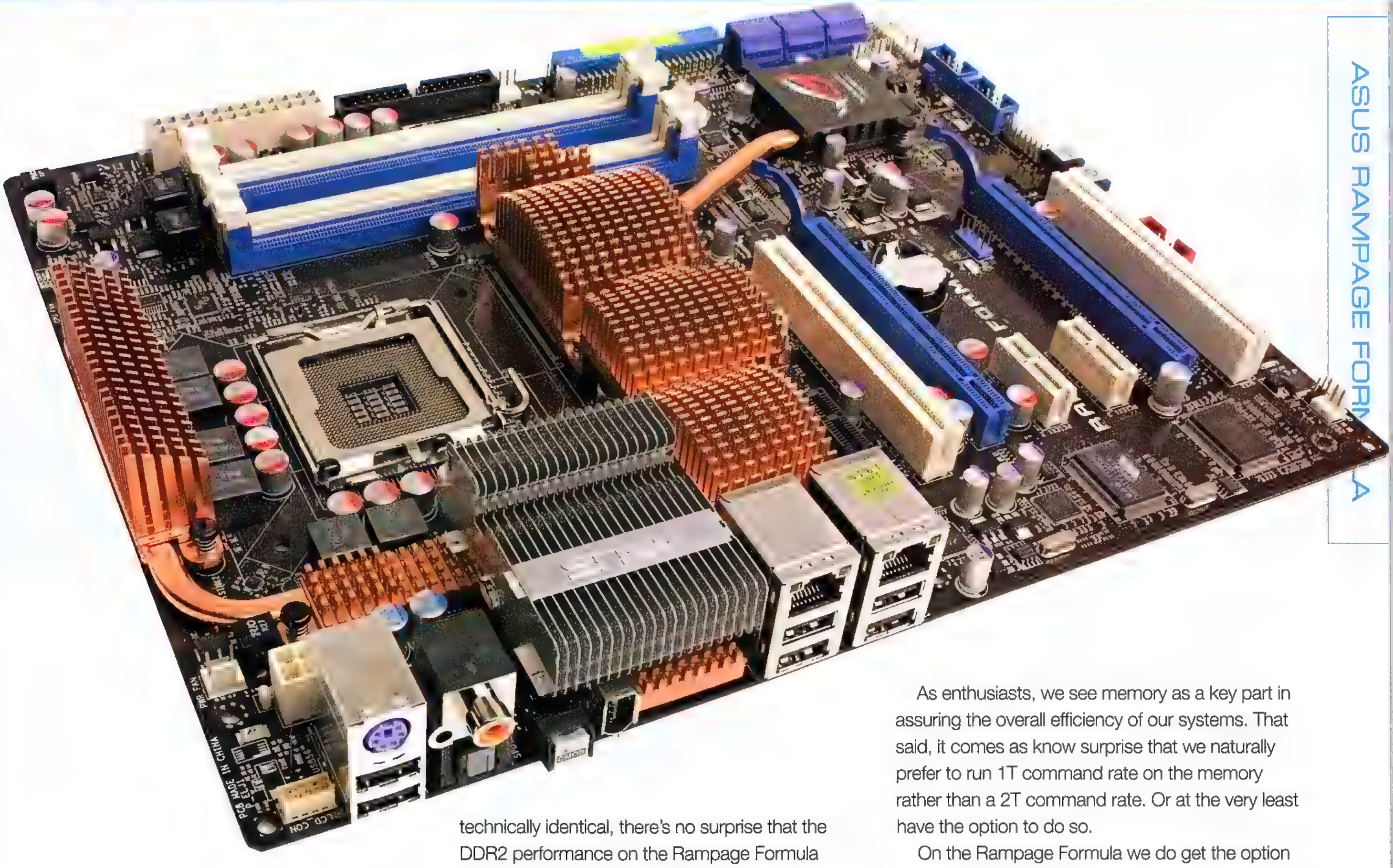
Core Speed: 2880.3 MHz
Multiplier: x 6.0 (6 - 8)
Bus Speed: 480.0 MHz
Rated FSB: 1920.2 MHz

Cache

L1 Data: 4 x 32 KBytes
L1 Inst.: 4 x 32 KBytes
Level 2: 2 x 6144 KBytes
Level 3:

Selection: Processor #1
Cores: 4
Threads: 4

Version 1.45



and within 10-20 bucks of one another in the market. Sure, with three boards share such similar traits, you'd be wondering why you'd bother buying the top-of-the-line when you can get the same performance by BIOS flashing a $100 cheaper board. But our biggest gripe is that even with all of this stream-lining; there are still a number of things that ASUS has managed to bugger up.

As mentioned already, the memory performance on the Maximus Formula left quite a bit to be desired. And desire we shall continue to. For this board has much the same inefficient handling of memory as its predecessor.

The past simple rule was that for best performance, DDR2 made its home with P35 and DDR3 mated with X38. With X38 and X48 being technically identical, there's no surprise that the DDR2 performance on the Rampage Formula leaves much to be desired, even when compared to the much older Blitz Formula based on P35.

One of the staggeringly obvious memory screw ups is with the efficiency of the 4:5 divider used during our testing with an FSB frequency of 400MHz. To be brutally honest, the 4:5 divider is an absolute dog and gets slaughtered like one by the efficiency of the 2:3 divider used during the 333MHz FSB testing.

The memory's got issues but at least we can do FSB comparisons while maintaining a given end frequency… or so we thought.

We wanted to do tests at 462MHz FSB with a 6.5x multiplier but, behold, just like its predecessors, the Rampage Formula's 6.5x multiplier simply doesn't work and defaults back to 6x.

But that's not the only thing broken in the BIOS.

As enthusiasts, we see memory as a key part in assuring the overall efficiency of our systems. That said, it comes as know surprise that we naturally prefer to run 1T command rate on the memory rather than a 2T command rate. Or at the very least have the option to do so.

On the Rampage Formula we do get the option between 1T and 2T command rates, but the problem is that it doesn't stick. You can you can happily set a 1T command rate in the BIOS, but what you end up with is 2T upon rebooting and entering the BIOS a second time.

While the board has its drawbacks in the memory department, it does manage to do at least something right.

Back when we looked at the Maximus Formula we were testing with Core 2 Duos rather than Core 2 Quads, as we currently do. Nonetheless, it's much easier to get high FSB frequencies on a dual core than on a quad core, naturally. And in this light, the Maximus Formula didn't pull too well in hitting high FSB frequencies with the Core 2 Duos.

Thankfully, of all the pages in the book not to pay attention to, the Rampage Formula chose the FSB overclocking page. And while overclocking quad cores is more difficult, the Rampage Formula still managed a very respectable 480MHz FSB max and 475MHz benchable. That's not far off the superior FSB overclocking of the 790i chipset and is a fair effort for an X48 based board. Not only that, the Maximus Formula only managed 520MHz FSB and that was only with a dual core.

If you must have this board, so be it, but ultimately for the money spent there are simply better offerings on the table.

45nm Quad	333x9; DDR2-1000 4-4-4-10 2T	400x7.5x6; DDR2-1000 4-4-4-10 2T	428x7; DDR2-1028 4-4-4-10 2T	475x6; DDR2-950 4-4-4-10
Super Pi 4M	1m 23. 601s	1m 24.458s	1m 23.210s	1m 28.202s
wPrime 32M	12.776s	12.699s	12.714s	13.403s
Hexus Pi Fast	30.28s	30.67s	30.69s	32.29s
Everest read	9059MB/s	8684MB/s	9588MB/s	8891MB/s
Everest write	7119MB/s	8473MB/s	9114MB/s	10061MB/s
Everest latency	57.0ns	63.3ns	54.8ns	63.6ns
CineBench R10 – Single Thread	3707	3702	3694	3525
CineBench R10 – Multi Thread	13201	12896	13396	12773

SCORE **6.0** OUT OF 10

ASUS P5Q Deluxe

Josh Collins is still struggling to figure out the alpha-numeric system of ASUS', but oh well, we're up to Q now.

SPECS

Price **$TBA**
Supplier **ASUS**
Website **www.asus.com**
Specifications **Socket 775; Intel P45 northbridge; ICH10R southbridge; ATX form factor; 3x PCIe x16; 2x PCI; 2x PCIe x1; 1x EIDE; 8x SATA; 1600MHz FSB; DDR2-1200.**

It's that time again and the Intel time machine is tick-tocking away.

This month we're seeing the release of a new chipset for Intel's Express line. This is in the form of the P45 Express, and is set to replace the aging 'Bearlake' based P35. That'll do P35, that'll do.

Normally the introduction of a new chipset is hailed as the next step forward in a sensible technological progression. P35 was a step up from P965, and X35 was way too long waiting to replace the ancient 975X. Then it seemed Intel's chipset division got a slap on the bum and told to go faster. So instead of creating something new, they just speed binned something old and called it something new; enter X48.

With this history, we were a bit hesitant about the P45 release, code named 'Eaglelake'. There had been whispers for some time, just like there is of X58 right now, about performance gains and overall improved functionality. Oh, and we were to get a new southbridge in the form of the ICH10R.

With the P35, X38 and X48 chipsets as recent examples, there's quite a lot the P45 has to do to distinguish itself firstly as different, worthwhile and useful.

The first box gets ticked by mere physical differences. The P45 'Eaglelake' based core is a 45nm manufacturing process and therefore requires less voltage than its 'Bearlake' 90nm predecessors.

Whether it's worthwhile and useful is harder to judge. Obviously this board is the first of what will undoubtedly be a string of future releases and is also in a rather infant state in comparison to 'Bearlake' chipsets, but we do take issue with the state in which ASUS' P5Q Deluxe featuring P45 is in. It doesn't so much feel like an infant; it's more of a premature birth.

Being first to market is everything in the IT industry, and this notion is even more prevalent in the hardware manufacturing sector; but rushing a product out and effectively using the paying public as beta testers, rather than coming out second, third or later still but with a stellar product, is poor form.

One of the most evident examples of the public beta testing concept is the complete lack of a working 2:3 divider. It simply does not work. At all.

For our testing of DDR2 based motherboards, we run a base standard of DDR2-1000 with latencies of 4-4-4-10 and a preference of 1T if possible. For this reason, when testing with a 333MHz FSB we require a 2:3 divider to obtain the DDR2-1000 frequency. But, it just doesn't work on this board. So we used the 5:8 divider, resulting in DDR2-1066 frequencies.

While the BIOS sports a lavish range of memory latency settings, the BIOS does not have an option for setting the command rate. Unless we're extremely blind, the darn thing just wasn't in sight, or at the very least, is not in a user-friendly location. This ultimately meant our memory trundled along at DDR2-1066 4-4-4-10 at a 2T command rate.

The new chipset looked to demonstrate strong memory bandwidth improvements, though this was hard to make a direct comparison due to the inability to run at DDR2-1000 frequencies.

Disappointingly, for this particular sample, we couldn't budge above a 400MHz FSB at all – even with a QX9770, a stock 400MHz FSB chip. And for a QX9650, it also stopped at the 400MHz mark.

We believe this issue to be specific to either ASUS and/or this model, as we've seen screenshots, and spoken to members of Team.AU involved in beta testing the GIGABYTE P45 boards, of them doing excess of 500MHz FSB, even close to 550MHz in some situations.

All in all, we're left with a rather unusual feeling about this board. We're glad to see P45 hit the market but then we also would really prefer to see a completely finished product instead of something that feels like it needs some more R&D time.

If you're keen on P45, chill for a little longer and wait and see what else comes to the market. After all, it's early days yet.

45nm Quad	333x9; DDR2-1066* 4-4-4-10 2T	400x7.5x6; DDR2-1066* 4-4-4-10 2T
Super Pi 4M	N/A	N/A
wPrime 32M	12.653s	12.649s
Hexus Pi Fast	30.67s	30.44s
Everest read	8974MB/s	9406MB/s
Everest write	7115MB/s	8516MB/s
Everest latency	59.0ns	58.7ns
CineBench R10 – Single Thread	3719	3712
CineBench R10 – Multi Thread	13099	13199

**Note: the memory was benched at DDR2-1066 instead of DDR2-1000 due to the 2:3 divider simply not working. Therefore DDR2-1000 with a 333MHz FSB was not possible*

SCORE

6.0 OUT OF 10

POWER OF 9

The family everyone's been waiting for has finally given birth to the 9600 GT, followed by its siblings, the 9800 GX2 and 9800 GTX. The family doesn't stop there, with the anticipated arrival of the Black Edition, this is a family that you would want to be a part of. To join the family or to learn more, visit www.XFXforce.com

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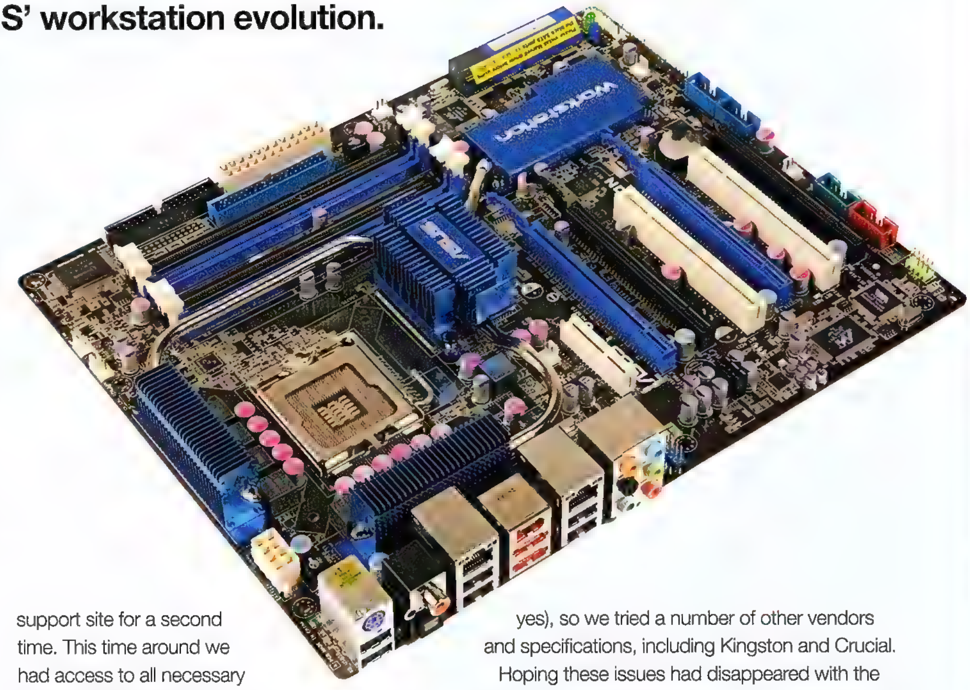
ASUS P5E64 WS Evolution

Josh Collins checks out ASUS' workstation evolution.

SPECS

Price $460
Supplier ASUS
Website www.asus.com
Specifications Socket 775; Intel X48 northbridge; ICH9R southbridge; ATX form factor; 4x PCIe x16; 2x PCI; 1x PCIe x4; 1x EIDE; 8x SATA; 1600MHz FSB; DDR3-1600.



Suggestively named an evolution over the previous P5E64 WS Professional, the P5E64 WS Evolution feels more like a step to the left or the right rather than forward. This isn't just in regards to its inline predecessor but ASUS' whole line of Intel chipset-based workstation-oriented products as a whole.

The workstation line of motherboards, or WS as it gets abbreviated to, has for some time been held in high regard for quality power regulation and good components; due to these two attributes it's also a strong overclocker, especially when under heavy load.

Prepped and ready to start benching this board, we first had a look on the support website for any driver and/or BIOS updates – as we do with every motherboard. We do tend to get boards a little earlier then the public for testing purposes so you guys have something to read on the product's release, but even so, when we tested this product it was in the channel and hitting retail. It's for this reason we were astonished to find not a single file on the support page for the P5E64 WS Evolution.

Not content with testing on a very early BIOS – the initial BIOS was 0115 and was an absolute dog to use – we put this board back on the to-do pile and carried on our monthly work.

Coming back to it nearly four weeks later we were pleasantly surprised when we visited the support site for a second time. This time around we had access to all necessary drivers and software, but most importantly, there had been a spate of BIOS updates.

Wanting to rid the board of the evil omen that was the 0115 BIOS, we swiftly flashed it to BIOS 0401.

> **...for this reason we were astonished to not find a single file on the support page...**

As mentioned, we had a pretty horrendous time with BIOS 0115. There were a number of issues, though the most prevalent was the instability of the memory and any memory tweaking we chose to do, particularly with the 1:2 divider. We thought perhaps this was due to an incompatibility with the Corsair memory being used (though Corsair sticks are generally validated on ASUS platforms – confusing, yes), so we tried a number of other vendors and specifications, including Kingston and Crucial.

Hoping these issues had disappeared with the 0401 BIOS, we eagerly dove into the chaos only to find, well, continued chaos. Admittedly the memory support and overall functionality was better, but it still left much to be desired. This is especially apparent when you consider the board is brethren to the very stable and successful P5E3 Premium, also based on the X48 chipset and utilising DDR3 memory.

We were, at first, only able to test at an abysmal stock 333x 9 and DDR3-1066 9-9-9-24 2T, which happens to be the JEDEC approved SPD latencies for the Corsair Dominator DDR3-1800 7-7-7-20. After some further perseverance we managed to get the 1:2 divider to kick in, thus giving us DDR3-1333, and then tweaked the memory to 5-5-5-15 with the command rate left set to AUTO in the BIOS. Past attempts of using a set 1T resulted in a no-boot. Amusingly, when set to AUTO the board initiates a 1T command rate anyway – whatever.

The QX9650 used for testing has delivered results way over 400MHz FSB and yet any attempts at 400x 7.5 were met with consecutive boot failures. Curious, we popped in a QX9770 with its native 400MHz FSB and had no issues at stock, but further testing was still very limited.

ASUS has released what we can only describe as a premature motherboard and we hope that through further BIOS updates the board can come good and regain the power within its silicon bloodline. At this particular point in time though, we cannot advise people to use this board when there are better solutions available.

45nm Quad	333x9; DDR3-1066 9-9-9-24 2T (SPD settings)	333x9; DDR3-1333 5-5-5-15 1T (Command Rate AUTO)
Super Pi 4M	N/A*	N/A*
wPrime 32M	15.975s	30.56s
Hexus Pi Fast	39.47s	12.683s
Everest read	6520MB/s	9982MB/s
Everest write	5665MB/s	7097MB/s
Everest latency	90.6ns	52.3ns
CineBench R10 – Single Thread	2945	3695
CineBench R10 – Multi Thread	10594	13259

**Note: for unknown reasons the Super Pi benchmark would not complete.*

SCORE 5.5 OUT OF 10

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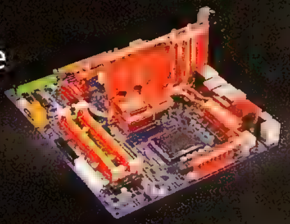

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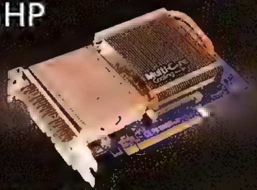

- ★ Intel CPU *(Model to be confirmed.)
- ★ Corsair DOM DDR2 TwinX

- ★ WD Raptor®

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Phenom X3 8750

Josh Collins takes a look at AMD's latest and – hopefully – greatest.

SPECS

Price **$233**
Supplier **AMD**
Website **www.amd.com**
Specifications **2.4GHz triple core; 65nm manufacturing process; 'Toliman' core; 3x512KB L2 cache; 2MB L3 cache; 12x multiplier; 3600MHz System Bus; 200MHz HTT; B3 stepping; 95W TDP.**

Last month we took a gander at a slew of new offerings from AMD. These included the 780a chipset, 780G chipset and the refreshed Phenom X4 quad-core range.

In the Phenom X4 review we mentioned the recent release of the Phenom X3 triple-core processor line from AMD, and this month we've gotten it to jump through hoops, play fetch and even tried to teach it to play dead.

Before we get into the thick of it all – the benchmarks – it is best that everyone is on the same page (preferably 46 at this stage!). This means knowing exactly what the hell this new triple-core product is from AMD.

For those of you with a keen eye for details and knowledge of the X4 range, the specs of the new X3 chips will look peculiarly familiar.

The new chip features three 512KB L2 cache (one per core) paired with one larger 2MB L3 cache, all communicating on a 3600MHz System Bus and a 200MHz HTT frequency. Based on the same 65nm fabrication process as the Phenom X4 quads and B3 stepping to boot, you'd be safe to say these new chips are remarkably similar to the quads. Actually, you'd be more than safe, you'd be right on point.

The X3 range represents a smart business decision from the peeps over at AMD HQ.

Due to AMD's decision to use a 'native' quad-core design, compared to Intel's multi-chip module (MCM) design, AMD has effectively also chosen to bare the brunt of an unexpectedly higher failure rate. In production terms, this means a lower overall product yield.

For every core that malfunctions on an Intel quad-core, they only need to remove the die which the failed core lies on and replace it with a working die to pair with the additional one (two cores). In contrast, for each AMD quad-core processor that fails, the whole die is scrapped and with it, the rest of the cores within the quad-core design. This means that Intel will theoretically have half of the overall quad-core die failures that AMD does.

As a result of this, AMD has devised a way to make use of these otherwise useless pieces of silicon engineering. The X3, in its simplest form, was devised by laser etching and removing the failed fourth core and L2 cache on the die while retaining a functional triple-core processor.

Some people may interpret this as a dodgy way to make such a processor. But in essence this style of product segregation has been around for a long time. When processors, from both the green and blue side of the fence, don't make a certain performance and/or quality grade, it is not unusual for parts to be removed or locked by laser etching to then produce a lower specification product that is completely functional in a lower performance bracket.

So, with a bastardised X4 newly dressed up as an X3 8750 sitting contently in our test system – comprised primarily of the ASUS Crosshair II, Corsair Dominator PC2-10000 memory and ASUS 9800GTX – we went about finding out what these new chips had to offer.

What we found was a chip that was on par with its quad-core brethren (clock for clock) in single threaded applications and, while slower than the X4s in multi-threaded applications, it did demonstrate higher efficiency with an average of 91.3 per cent compared with the usual 75-85 per cent efficiency found in the quad-core solutions.

While this is good news for the X3 range, it does struggle to find an appropriate position within the market. Priced at $233, it's fighting an up hill battle when you consider that a Phenom X4 9550 rated at 2.2GHz can be bought for the same price. It may be 200MHz slower at stock, but it does have a whole extra core. Pair this with some rather low overclocking capability for the X3 8750 – at least for the sample we tested – and it's quite hard to actually want to put dollars on the table for an X3.

Phenom X4 9850	**200x12.0; DDR2-800 4-4-4-12 1T**	**217x12; DDR2-866 4-4-4-12 1T**	**234x12; DDR2-938 4-4-4-12 1T**
Super Pi 4M	2m 49.775s	2m 36.141s	2m 26.526s
wPrime 32M	23.585s	22.088s	20.327s
Hexus Pi Fast	48.09s	44.59s	41.51s
3DMark06	10958	11684	12420
CineBench R10 64-bit – single thread	2582	2786	3044
CineBench R10 64-bit – multi-thread	7068 (2.78x efficiency)	7473 (2.68)	8353 (2.74)
Everest Read	6866MB/s	7326MB/s	7861MB/s
Everest Write	4555MB/s	4934MB/s	5345MB/s
Everest Latency	64.5ns	60.8ns	56.0ns

SCORE

6.5 OUT OF 10

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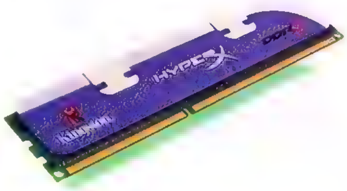

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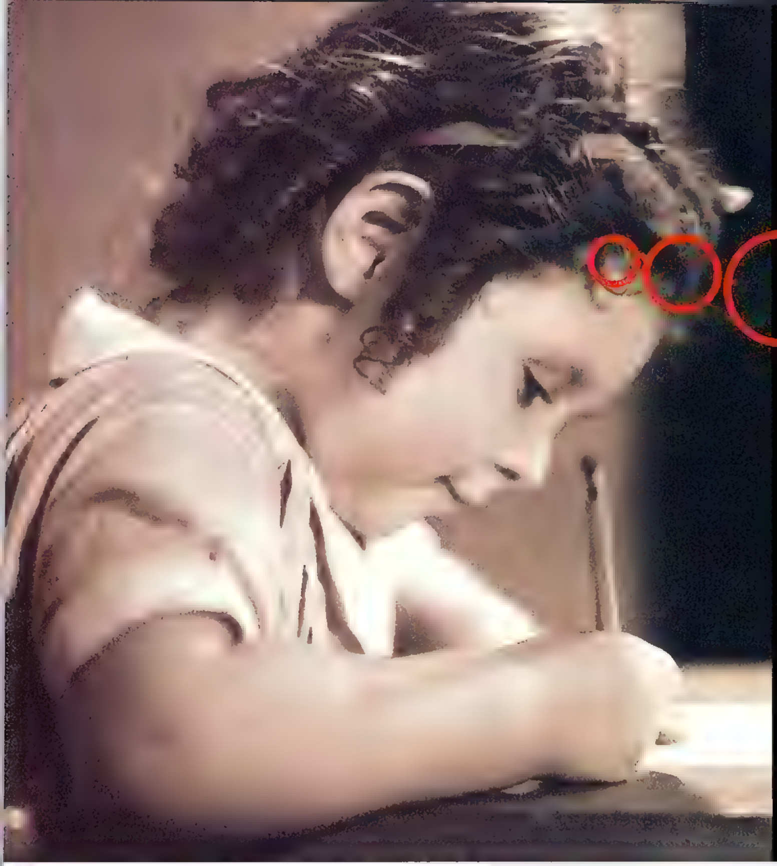

Everything I write comes out rubbish. Brilliant!

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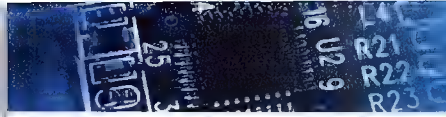

ASUS HD3850 Top

David Field is pleasantly surprised at this little card that can from ATI and Asus.

SPECS

Price **$199**
Supplier **Asus**
Website **www.asus.com.au**
Specifications **730MHz core; 950MHz memory (1900MHz effective); 512MB GDDR3; single 6-pin PCI-e power connector**

Given how many NVIDIA-based cards Asus churns out, it's a little odd seeing an ATI-based card from the same company.

It's almost like seeing a grandmother being towed down the road on a skateboard by a dozen leashed cats, in the sense that it's mostly a reference design with a custom dual slot cooler. Actually, it's not like the grandmother at all, but the cooler ought to provide a little more overclocking headroom than the stock cooler even though the card runs at stock speeds – 729 MHZ on the core and GDDR at 950MHz.

This means it pulled in respectable results in our test rig. Our *Crysis* test averaged 16.08fps, dipping to a minimum of 10.82 and maxing out at 18.71. 3DMark06 returned a score of 12,089 and the old but still valid and more GPU intensive 3DMark03 returned a score of 37,410.

Aside from the straight out performance, you'll get support for DirectX 10.1 and its incremental performance increases. The card also has a small chip that decodes H.264 and VC1 video, which takes the extreme decoding load off your CPU. It's also got its own onboard sound chip and a converter dongle that lets you get HDMI out of one of its DVI ports, meaning it'll make your PC HDCP-compliant.

This means that you'll be able to play back HDCP content, if and when the copy protection technology is activated. All the hardware in your video chain from disc to screen have to support it, otherwise the video will have a minor seizure and be reduced to a crappy low resolution window or won't play back at all. Part of the protection mechanism is that video and audio have to be sent through the one cable by a single device, hence the sound chip on the video card.

You can drop a second card into crossfire if you wish, and performance will increase depending on how well the game you're playing has been coded to work in with the AMD/ATI catalyst driver for parallel rendering.

At the end of the day, the price is in the sweet spot and the video playback is better than the competition if properly configured, which leaves with you with a good bang for buck card for over-powered media centres and budget systems.

SCORE **8.5** OUT OF 10

XFX 9800GX2 512MB Black Edition

The 9800GX2 is back in black, but is it any better? **Josh Collins** finds out.

SPECS

Price **$890**
Supplier **XFX**
Website **www.xfxforce.com**
Specifications **700MHz core; 1050MHz memory (2100MHz effective); 1700MHz shader; based on 65nm G92 core; 256 (128x2) stream processors; 1024MB (2x512MB) GDDR3; dual slot PCB with active cooling solution; 6-pin + 8-pin PCIe power connector**

Last month we touched on the fact that the price of the 9800GX2 cards is a sore point. The XFX 9800GX2 Black Edition takes that conundrum to the next level.

With a hip-pocket-burning $890 street price, you'd want this card to ship with a bucket load of street cred to boot… but then, this kind of stuff isn't considered cool in the mainstream anyway.

So with our wallet stung, we're left hoping to God there's a performance reason for purchasing.

The angels must've heard our pleas because the XFX card does at least deliver in the performance stakes. This is due to pre-overclocked frequencies on this card. This particular sample sports a 700MHz core, 1050MHz (2100MHz effective) memory and 1700MHz shader. For perspective, the reference design features a 600MHz core, 1000MHz (2000MHz effective) memory and 1500MHz shader.

The pre-overclocked frequencies aren't only a marked improvement on the reference clocks but also result in a marked improvement in performance over the reference frequencies.

As a result, the XFX 9800GX2 Black Edition lays claim to the crown in terms of class leading performance. And rightly so, pulling a clear 5fps ahead of reference cards in *Crysis* as well as 1k and 5k marks ahead in 3DMark06 and 03 respectively.

Thankfully, XFX appears to have gotten sick of bundling aging game titles. The hardware comes hooked up with a copy of *Assassin's Creed* for PC.

While the increased performance and decent game bundle is a rather solid improvement over the other offerings in the market, the price simply devastates the gain made by these improvements.

In the end, $800 is simply too much to pay for a hassle free and guaranteed overclock bundled with a slightly newer game.

45nm Core 2 Quad @ 400x10; DDR3-1800 7-7-7-20 1T

	Crysis			**3DMark06**	**3DMark03**
	Avg	Min	Max		
1x XFX 9800GX2 1024MB Black Edition	42.60	21.71	48.56	20263	70693
1x 9800GX2 1024MB	38.74	22.66	43.64	19640	65188
1x 9800GTX 512MB	22.95	17.89	26.09	14973	43278
1x 8800GTS 512MB	20.32	15.51	23.35	14176	41583
2x 8800GTS 512MB	31.74	21.58	40.68	20009	68217

Note: all other cards benched at reference clock speeds, XFX @ stock pre-overclocked frequencies

SCORE **6.0** OUT OF 10

Corsair DHX CM3X2G1600C9DHXNV

Josh Collins checks if Corsair can save the souls of stricken 790i users.

atomic hot award

SPECS

Price **$900 - likely**
Supplier **Corsair**
Website **www.corsair.com**
Specifications **2x 2GB kit; PC3-13000; DDR3-1600; 9-9-9-24; 1.8v; 240-pin DIMM; Non-ECC Unbuffered DDR3; Micron ICs; Lifetime warranty.**

Last month we featured Corsair's DDR3-1600 C7 4GB with Intel Extreme Memory Profile support (XMP), and this month we've had another kit of Corsair RAM arrive on our doorstep.

With the DDR3 needs of Intel platform users, specifically X38 and X48, seen to by the good folks at Corsair, it appears the company likes to share the love. It has now invested time and money into binning kits specifically for use on NVIDIA's 790i chipset motherboards.

Two notable attributes of this binning process is, with the maintenance of the DDR3-1600 frequency yet to accommodate the frequency on the 790i platform, alpha latencies were eased. This time around, the kit is based around a CAS 9 latency set with the full alpha timings list reading 9-9-9-24 instead of the 7-7-7-20 found on the Intel XMP kit. Although the latencies are quite different, performance is still much the same due to the intricacies and differences between the 790i and X38/X48 chipsets.

One of the biggest complaints, not only for 790i users but NVIDIA chipset users in general, has been regarding the incompatibility of memory with the motherboard's chipset. To resolve this issue Corsair has taken the time to individually test, validate and certify a specific range for use on this potentially troublesome chipset. This concept gave birth to the extremely annoyingly named Corsair DHX CM3X2G1600C9DHXNV.

While the kit's name certainly isn't a verbally friendly creation, it does hold all the information the end user could want to know. From start to finish the otherwise random alpha-numeric bunching indicates that the kit is DDR3 memory, a 2GB stick (thus part of a 4GB total kit), operates at DDR3-1600 frequencies with CAS 9 based alpha timings, belongs to the DHX range (close cousin to the Dominators) and last but not least, has been binned for use on an NVIDIA platform – naturally this leads to use on NVIDIA's only DDR3 platform featuring the 790i chipset.

Having had the chance this month as well as last November to drop in at the Corsair HQ while visiting Silicon Valley, we've been privy to Corsair's validation process. Using the knowledge of in-house tester and renowned overclocker Bachus_Anonym, each kit is meticulously and vigilantly put through its paces to meet in-house benchmarks for performance and quality are met.

We see a lot of memory come through the labs of Atomic. From the likes of largely known brands like Kingston and OCZ through to the smaller companies such as G.Skill and Team Group, even the smaller companies such as Apogee. But it's the consistent quality of Corsair modules that leave an impression on us.

The impression we're left with is one of quality, reliability and consistency. We've never had dead on arrival (DOA) kits arrive for testing, be it from channel sources or direct. We've found through extensive testing of our own and from other enthusiasts that the kits will often exceed stock specification. And most notable, is the ability for the company to do this time and again.

True to form, this specially tailored kit for the 790i chipset holds its own both within the ranks of its branded brethren and the competition.

During testing the kit not only operated effortlessly at the stock specified settings but also exceed the mark by operating at tweaked settings such as DDR3-1600 6-6-6-18 1T and DDR3-1800 7-7-7-20 1T.

If you've sunk your investment into a 790i motherboard, quality Core 2 Duo chip and undoubtedly a kick-arse GPU to boot, then be sure to round out the awesome gaming beast with sufficiently awesome and beastly memory modules.

	400x8; DDR3-1600 6-6-6-18 1T	400x8; DDR3-1600 7-7-7-20 1T	400x8; DDR3-1600 9-9-9-24 1T	400x8; DDR3-1800 7-7-7-20 1T
Capacity	2x2GB	2x2GB	2x2GB	2x2GB
Super Pi 4M	1m 18.234s	1m 18.374s	1m 18.873s	1m 18.453s
wPrime 32M	11.918s	11.949s	12.000s	11.872s
Hexus Pi Fast	28.61s	28.50s	29.06s	28.64s
Everest Read	12057MB/s	11723MB/s	11267MB/s	11681MB/s
Everest Write	8526MB/s	8526MB/s	8526MB/s	8526MB/s
Everest Latency	50.0ns	52.5ns	57.9ns	45.4ns

SCORE **9.0** OUT OF **10**

WGT
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intel

Recommended PC hardware
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Recommended Operating System
Windows Vista Ultimate

Apogee GT DDR3-2000

Great in theory, but **Josh Collins** isn't so sure about the practice of this unique memory kit.

SPECS
Price **TBC**
Supplier **Protac**
Website **www.protac.com.au**
Specifications **DDR3-2000; 9-8-8-24 2T; PC3-16000; 2.1v operating voltage; Micron D9 ICs; 2x 1GB kit; 240-pin DIMM; Non-ECC; Unbuffered DDR2; lifetime warranty.**

Featuring stock latency timings of 9-8-8-24 at a blistering DDR3-2000 with 2.1v, it's no surprise that the Apogee GT kit boasts a sizeable heatsink design to account for the inevitable thermal waste. What's different, however, is the manner in which the solution has been implemented.

The first part takes a leaf from the book of Cell Shock (renowned German performance memory manufacturer), with significantly solid slabs of metal literally bolted together to clamp onto the memory ICs. Then, with an interesting design coming from Apogee, a finned heatsink plate is bottled to the top of the memory modules.

The concept itself is fairly straight forward, but for the end user that isn't used to regularly tinkering with hardware, or confident in handling multi-hundreds of dollars worth of memory, actually implementing the cooling solution in a system could be a nerve-wracking experience. The bolting of the heatsink plate to the memory means the memory has to be in the 100 per cent correct position to then slot into the DIMM slots.

Strutting its stuff with a stock specification of DDR3-2000 C9, we were eager to find what these new modules were capable of. When we get a kit such as this, we first run them at known quick settings such as DDR3-1600 C6 and DDR3-1800 C7. The modules did these frequencies with ease yet when it came time to perform at the stock specifications, they left a lot to be desired.

Setting to DDR3-2000 9-8-8-24, the system failed to boot. Loosening the timings slightly to 9-9-9-24 also delivered the same result. We tried additional voltage before concluding that the Apogee GT DDR3-2000 9-8-8-24 was over-specced.

Not an easy kit for the average user and unable to operate at the proposed specs, we can only advise people to stay with more well known manufacturers such as Corsair, Kingston, Team Group, Patriot and G.Skill.

	400x8; DDR3-2000 9-8-8-24 1T	400x8; DDR3-1600 6-6-6-18 1T; 790i	400x8; DDR3-1800 7-7-7-20 1T; 790i
Super Pi 4M	N/A	1m 18.951s	1m 18.343s
wPrime 32M	N/A	12.089s	12.026s
Hexus Pi Fast	N/A	28.58s	28.56s
Everest read	N/A	12034MB/s	11551MB/s
Everest write	N/A	8525MB/s	8525MB/s
Everest latency	N/A	43.8ns	51.8ns

SCORE 6.0 OUT OF 10

WD VelociRaptor WD3000GLFS

David Field spins up to operating speed in order to check out the latest from Western Digital.

atomic hotaward

SPECS
Price **$399**
Supplier **Western Digital**
Website **www.westerndigital.com**
Specifications **300GB; 10,000 RPM; 16MB buffer; SATA 3 Gb/s; five year limited warranty**

The old Western Digital Raptors have been getting, well, hmm, how to put this delicately trounced by standard 7200RPM drives as capacities rocket toward the terabyte point.

High capacity drives pack more data onto the platter, which means more data is passed under the head assembly per rotation than lower density drives. And as the largest Raptor you could get used to be 150GB, the shine was taken off its highest raw throughput crown as other drives increased their capacity. It was the Raptor's low latencies, a product of its high spindle speed, where the drive really shone.

Western Digital has pulled off a few tricks to make the new Velociraptor compete. The capacity is now at 300GB, and most interestingly the drive has shrunk to the 2.5in size of SAS server drives. They look like laptop hard drives, but are 12mm thick (instead of 9) and need 12 volts to run instead of five, so you won't be able to get them running in your laptop without serious modding. We salute those of you (and your disposable incomes) who plan to try anyway.

It now uses a SATA 2 interface, and during burst transfers can actually use the extra bandwidth that SATA 2 provides. The small, fast platters (there are two of them) push 249 MB/s at their peak burst mode, and average about 110MB when they read. Most impressive are the seek times, which are at 7.2ms in our HD Tach synthetic tests.

To keep things cool, the Velociraptor comes screwed to a large heatsink, dubbed the Icepak. It keeps the small drive compatible with current cases, because you screw the heatsink, not the drive, into your 3.5in bay – just be aware that the drive's power and SATA connectors don't line up with the standard position that you get with normal hard drives, so you won't be able to slide one into a drive caddy. Which you shouldn't be doing for heat reasons anyway.

It wins the game of transfer speed and low latency. The fastest consumer hard drive is now back on its pedestal.

SCORE 9.0 OUT OF 10

Logitech Driving Force GT

Josh Collins is adept at keeping his eyes on the road, and his hands upon the wheel. Especially this wheel.

SPECS

Price **$165**
Supplier **Logitech**
Website **www.logitech.com**
Specifications **PS3 and PS2 compatible; force feedback; one year limited hardware warranty; USB connectivity; official wheel of Gran Turismo series**

The Driving Force GT is a welcome addition to Logitech's steering wheel lineup and a beauty for *Gran Turismo* fans.

The new wheel feels firm and responsive, actively reflecting the individual feel each car's steering column should have. With a little more initial give followed by the welcomed tightening of the shaft, as the force feedback gears kick in the Driving Force GT delivers a more immersive and slightly more believable impression of driving than its older G25 brother.

While the wheel itself sees vast improvements in immersive feel over the more expensive G25, it falls flat on its back in the pedals department. Paired with a set of flimsy plastic pedals and without a clutch, the feeling of putting the pedal to the metal is simply lost. There is no pressure as you push the pedal down; it simply falls flat. It's not unlike simply mashing the accelerate button on a normal controller.

Being the Atomic crew, we did try and Frankenstein our two favourite parts; the wheel of the GT and the pedals of the G25. Unfortunately the G25 pedals had a different pin-out compared to the GT so we were stopped in our tracks before we could even have any electrical issues.

While the GT wheel may lack the aluminium flappy-paddles of the G25 it does have smaller plastic buttons in similar positions. These feel comparatively diminutive but at the same time beat the hell out of using the crappy little gear shifter horribly placed on the right hand side of the wheel. While these may suck, the inclusion of all the necessary PS3 buttons, even the 'PS' button, alongside additional *Gran Turismo* buttons, makes for easy menu navigation and superb car setup – even mid race.

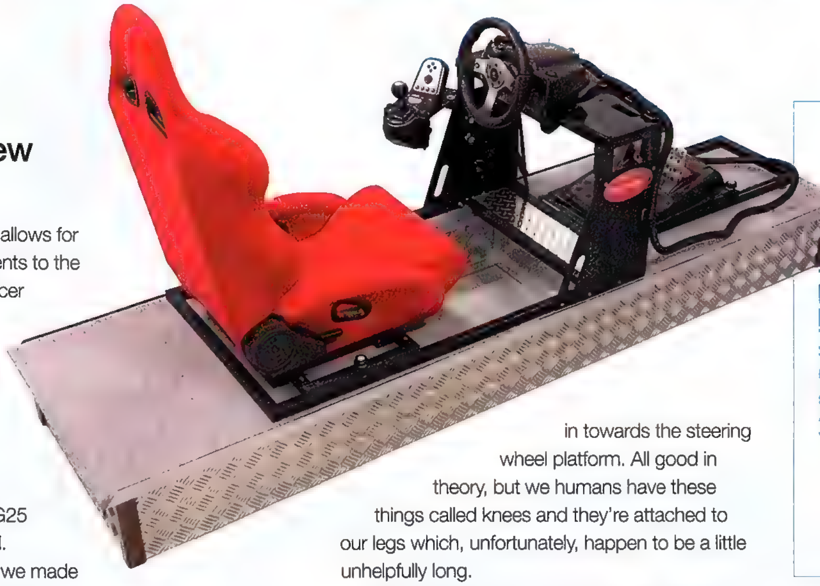
The GT may lack the sensual feel of hand stitched leather found on the G25 but it still manages to provide a rubber molded wheel with enough contour and texture that it doesn't feel cheap.

It may lack the finesse of some wheels, and only work with the PS3 and PS2, but the Driving Force GT is still a solid offering and great for some *GT5: Prologue* lovin'.

SCORE **7.5** OUT OF 10

Cyberkart

Once again, **Josh Collins** writes a review by the seat of his pants.

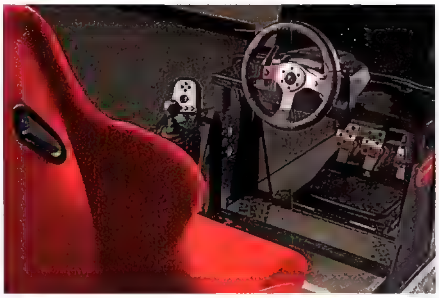


SPECS

Price **$1375**
Supplier **Cyberkart**
Website **www.cyberkart.com.au**
Specifications **Bucket racing seat; adjustable length for seat and pedal comfort; 16.6kg - 6.6kg frame, 10kg seat.**

This is one of the few gaming implements that truly is a big boy's toy. It's price makes the Cyberkart a product for the dedicated driving enthusiast but this isn't necessarily a bad thing. For the money spent on the unit the amount of enjoyment such an enthusiast gets out of it makes justifying the cost all that easier.

The Cyberkart is constructed out of anodised aluminium tubing and features an adjustable sliding bucket seat as well as an adjustable sliding pedal platform. This allows for easy adjustments to the liking of the racer sitting in the driver's seat.



A perfect companion for the Cyberkart is the Logitech G25 steering wheel. Knowing this, we made sure we had a G25 on hand for testing and let us tell you one thing with complete confidence; it was bloody cool.

Logitech's G25 isn't the only wheel that can be used with the unit, it is also compatible with the Xbox 360 steering wheel and other Logitech wheels, such as the recently released Driving Force GT.

Still, even with the abundance of positives, there are very few things that are perfect and there are still areas to be improved in the Cyberkart. One such area is the height and depth of the spacing between the bucket seat, steering wheel platform and the pedals. We found that to obtain maximum down pressure on the G25 pedals for maximum acceleration, we needed to pull the pedal platform in towards the steering wheel platform. All good in theory, but we humans have these things called knees and they're attached to our legs which, unfortunately, happen to be a little unhelpfully long.

This resulted in the top of our knees rubbing up against the underside of the plastic platform, and an all round uncomfortable drive for the aggressive long haul.

All in all, the Cyberkart is unmatched in the market for the price to performance (where performance = fun) value. We happily give the current Cyberkart our seal of approval but like all good things, there is still room for improvement.

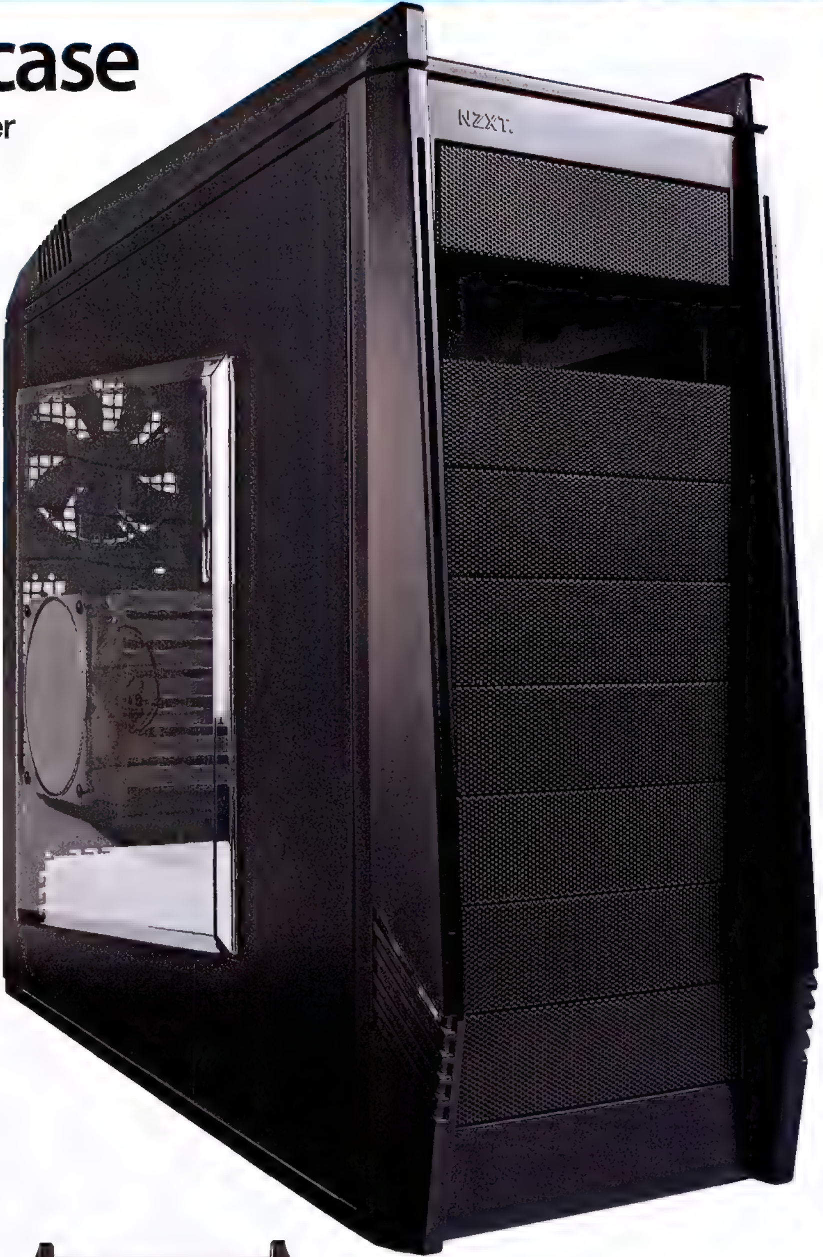
SCORE **8.0** OUT OF 10

NZXT Tempest case

David Hollingworth casts his eyes over another plastic fantastic NZXT case.

SPECS

Price **$159**
Supplier **Australia IT**
Website **www.australiait.com.au**
Specifications **211.5 x 521.5 x 562mm (W x H x D); 2x 120 mm Blue LED (front), 1x 120 mm (rear), 1x 120mm Blue LED (side panel), 2x 140mm Fan (top); 8x internal 3.5in drive bays, 1x 3.5in external drive bracket, 3x 5.5in external drive bays; E-ATX ATX, MICRO-ATX, BABY AT; Steel and plastic construction.**



Cheap and cheerful is the name of the game with NZXT cases, and this newest does not fail to please on either account. The Tempest is branded as a higher-end performance rig, and to that end it's jam-packed with fans – five in total, spaced between the front, top, rear and side panels.

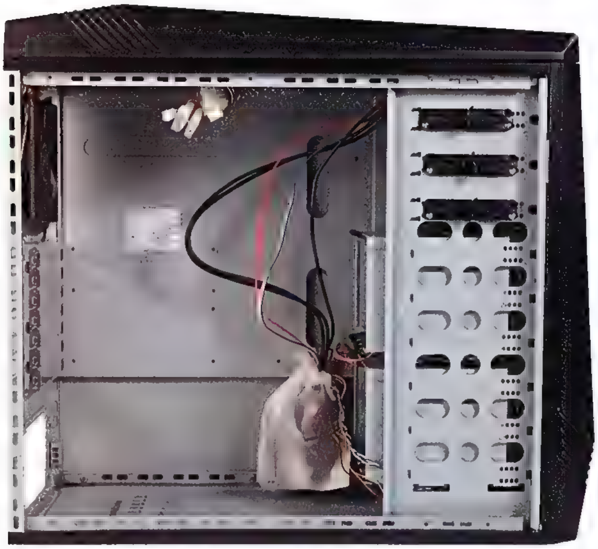
The case is obviously designed to push a lot of air over your hot components, and it does so in a reasonably quiet manner. The one let-down in this cooling mix, however, is the rather twee clear plastic panel set. Not only does it feel a bit too light and tacky, and easy to scratch to boot, but it vibrates rather loudly. A bit of after-market care can easily fix this, but it's certainly a mark against.

Another mark against the Tempest may be its similarity to the Antec line of gaming cases. The strong black lines, mesh highlights and clear side-panel are pretty common throughout many case designs, but the Tempest skims a bit too close to outright copying, even down to the blue LEDs and similar highlights. Then again, the Antec 900, for instance, is a touch more expensive. It's obviously a matter of taste, but if this blocky style of case design is your thing, go crazy.

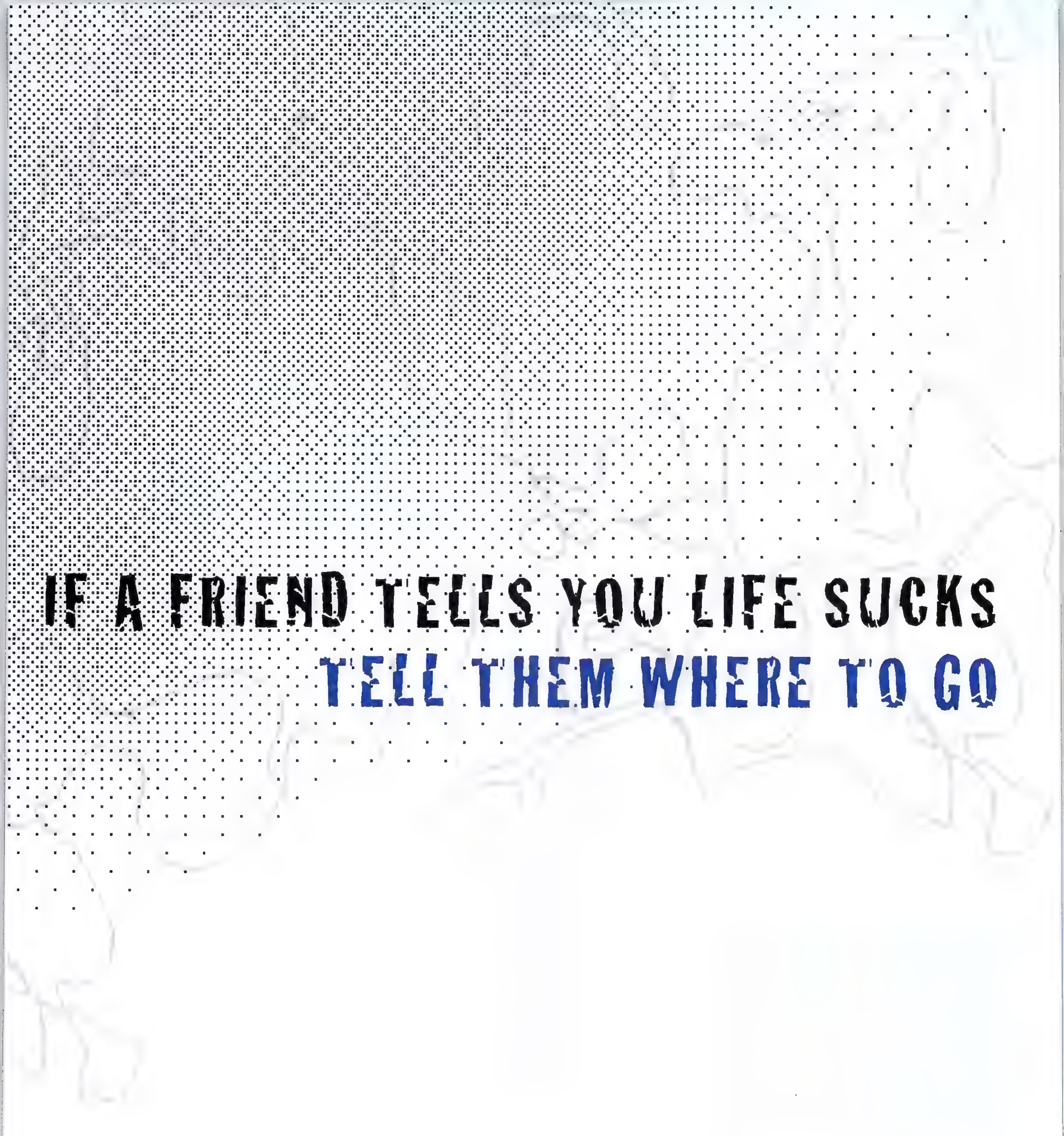
Build quality is of NZXT's usual standard, which is to say that with a solid steel case you're always going to be pretty tough. There are a few extraneous rattles coming from the depths of the case, and a few rough finishes here and there on exposed metal edges, but over all the interior is clear and easy to access, and the side panel itself swings out with ease whenever you want to access the case's innards. Given the weight of the case you may not want to be using this as a heft-and-carry LAN case. Given that more than a casual knock will start displacing the plastic trim on the case's front fascia, you're better off leaving this in place once your system's built.

One of the claims that NZXT makes about the case is that it's 'water cooling friendly', and while we do like most of what the Tempest does, water cooling is one thing we're not sure about. It's absolutely got room for a radiator in the chassis, but the access for your cooling loop, and the rubber grommets lining them, are sadly sub-standard.

As it stands, it's NZXT's own claims that let the Tempest down, proving that the company might have reached a little bit too high in regards to this design. There's still a lot to like about the case, don't get us wrong, but there are better alternatives at the same price-point.



SCORE **6.5** OUT OF **10**



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Alienware M15X

It's the most expensive laptop we've looked at yet. **David Hollingworth** ponders if you get the right amount of bang for your buck.

SPECS

Price **$5,999**
Supplier **Alienware**
Website **www.alienware.com.au**
Specifications **Intel Core 2 Duo X9000 (2.8GHz), 4GB 667MHz DDR2 RAM, 512MB NVIDIA GeForce go 8800M GTX, 200GB SATA HDD, 2x Blu-ray/DVD-RW drive, Internal Intel Draft N wireless, a whole mess of branded extras.**

On the design front, Alienware's high-end gaming rigs tend to turn people on or off based on their looks alone. The design ethic of the company is pretty unique, and it is often either loved or hated; which is why we were quite surprised by this rather understated notebook design when it crossed our testbench.

In fact, it could almost be called retro in its simplicity, and were it not for the alien-head logo smack in the middle of the clam-shell you could be forgiven for thinking it's an ancient desktop replacement from the days of yore. Flip that lid, though, and you'll see that the design bods at Alienware are still earning their crust.

The standard notebook keyboard and fascia may not be much to look at, apart from the non-standard font gracing the keys, but turn the m15x on and it's a whole other story. The keyboard lettering, key outlines and sundry other bells and whistles light up from within. There's even a thin strip of lighting around the entire edge of the screen bevel and the touchpad!

This might seem like excessive bling, but if you've ever peered at your keyboard in a dark room trying to find the B key to bandage yourself in a game, and grenned yourself to death instead with the G key, for instance, this is pretty neat. Neater still is the completely indulgent ability to tweak every lit bit of kit to one of ten or so colours, from icy blues to dangerous looking reds.

Jo, our ad gal, was very impressed with the pink lighting (I am so dead… *-ed*).

The keyboard feels suitably solid and key feedback is nice and stiff. The cursor keys are slightly offset, to keep key-mashing fingers away from annoying mis-keys, too. The touchpad received a mixed reception, however; most of the crew loved it, but there were one or two sets of fingers that found it near impossibly sticky.

There's an elegant sufficiency of ports scattered about the left and right hand sides of the m15x, and thankfully none at the rear. Of particular note is USB 2.0 ports on either side of the keyboard, and HDMI out for some hi-res output on larger screens. Given that our test machine featured a Blu-ray drive, this is great for those who've not yet made the switch up to HD viewing in their loungeroom. With the lights turned low, the backlit keys make skipping chapters and similar shenanigans super easy.

Speaking of larger screens, another thing that's obvious from the get-go is that the 15.4in screen on the m15x is, well, only a 15in screen. A lot of 'gaming grade' laptops plump for a 17in model – and subsequently weigh a tonne and kind of miss the point of being portable. At 15in, you still get a perfectly serviceable screen, and have a much lighter laptop to lug around. An interesting choice, and one we think is wise in the long run.

However, all the wise choices in the world don't add up to a hill of beans if your wisely kitted gaming lappie can't cut the pixel mustard. With a single 8800 GTX onboard, you might expect good performance – and you wouldn't be disappointed! Once we realised that someone had stealthily turned on the m15x's 'Stealth' setting – and therefore throttled performance in favour of battery life – and got our machine purring along at maximum speed, both 3DMark06 and *Crysis* returned some pretty impressive scores.

The former returned a damned pleasing 9312 3DMarks, easily beating the Dell M1730 to top place amongst all of the gaming laptops we've recently reviewed, as well as managing *Crysis* at 1280 x 1024 with all settings turned way the hell up – averaging 12fps is no mean feat. Drop those resource hungry settings down a notch and you'll have even smoother gameplay, but frankly it's more than playable on even high settings.

About the only gripe we have – and it's common one with high-end systems – is the choice of 4GB of RAM. The m15x is not running a 64-bit OS, so with the onboard video's 512MB cutting into Vista's allocation limit, you're simply wasting a portion of that RAM. 3GB would be a much more realistic figure, and cut the price a wee bit to boot.

That said, while you do pay a pretty penny for the m15x, you do at least get some serious performance and great peripherals – like the Blu-ray drive and a set of pretty decent speakers to add some real boom to your gaming – as well as some unique lighting and bling. Gaming laptops are still a long way from challenging their desktop brethren, but if you absolutely had to have a mobile gaming system, this is probably the one we'd recommend.

SCORE **8.5** OUT OF 10

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Lenovo Y710-200 Gamers Edition

David Hollingworth wants so very much to like this machine...

SPECS

Price **$3,499**
Supplier **Lenovo**
Website **www.lenovo.com.au**
Specifications **Intel Core 2 Duo processor T9300 (2.5GHz), 17in WUXGA LCD (1920 x 1200), ATI Mobility Radeon HD 2600 512MB, 500GB HDD (250+250) 5400rpm, 2GB DDR (667), Blu Ray ROM Dual Layer CD/DVD Recordable, 1.3 Megapixel Integrated Camera, 4.1 Surround Sound System, Modem, 10/100 LAN, Intel PRO/Wireless 4965AGN, Bluetooth; Windows Vista Home Premium.**

We wanted so very much to like the Y710-200 from Lemovo. For one thing, the Lenovo brand is a super-reliable benchmark for quality mobile machines with a pedigree that stretches back to when it operated under the IBM moniker. For another, the new IdeaPad range – the consumer cousin of the more well-known ThinkPad – features some very sexy kit. From the desktop-replacing entertainment behemoth that is the Y510 to the ultra-portable and ultra-stylish U110 (which we'd take over an EeePC any day), Lenovo's doing some good work bring its corporate expertise into the shoulder bags and loungerooms of everyday computer users.

Unfortunately, despite looking pretty good on paper, the Y710-200 is bit of a disappointment in reality.

It's a good looking unit, at least, with a piano-like mirror finish on the upper fascia that just can't wait to soak up your finger prints. On either side of the chassis you get all the usual ports, including four USB, and the leading edge houses a multi-card reader alongside audio jacks and controls. Flip the clamshell and you're treated to a gorgeously bright 17in display, well-spaced keyboard and something that Lenovo calls the Game Zone.

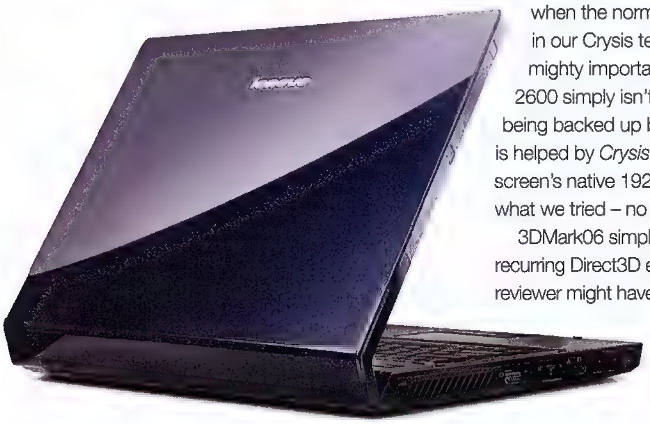
This is a delightfully cheesy and chunky LCD display in old-school orange, a switch to throttle or increase fan and processor performance, and some random buttons between a set of curiously placed arrow keys The arrow keys might be more useful if they were on the left-hand side to use as an alternate WASD set-up, but over here all they do is remind you of why you should always plug a mouse in to play games on a laptop.

The other four keys are customisable hotkeys, to bind however you see fit.

There's a lot of thoughtful little flourishes spread about the Y710-200, from the LED backlit touchpanel to control Dolby setup to the Blu-ray drive and surprisingly effective subwoofer. But all the bells and whistle in the world cannot help this laptop in the performance stakes.

The Turbo setting doesn't really effect processor speed – which sits at 2.5GHz on the display, oddly enough – but it does ramp up the fans. It only really gets you an extra frame or two per second, but when the normal setting can barely top six FPS in our Crysis testing, those extra frames are mighty important. The onboard Radeon HD 2600 simply isn't up to such a challenge, despite being backed up by 2GB of RAM. None of this is helped by *Crysis* finding itself locked into the screen's native 1920 x 1200 resolution. No matter what we tried – no dice. But at least it ran…

3DMark06 simply failed to launch due to a recurring Direct3D error. Suspecting that a previous reviewer might have introduced some instability to the system, we sent it back for a refresh, but the same problem occurred. It just feels like, deep down and at a basic hardware-talking-to-software level, the Y710-200 is struggling to live up to other machines in the gaming arena.

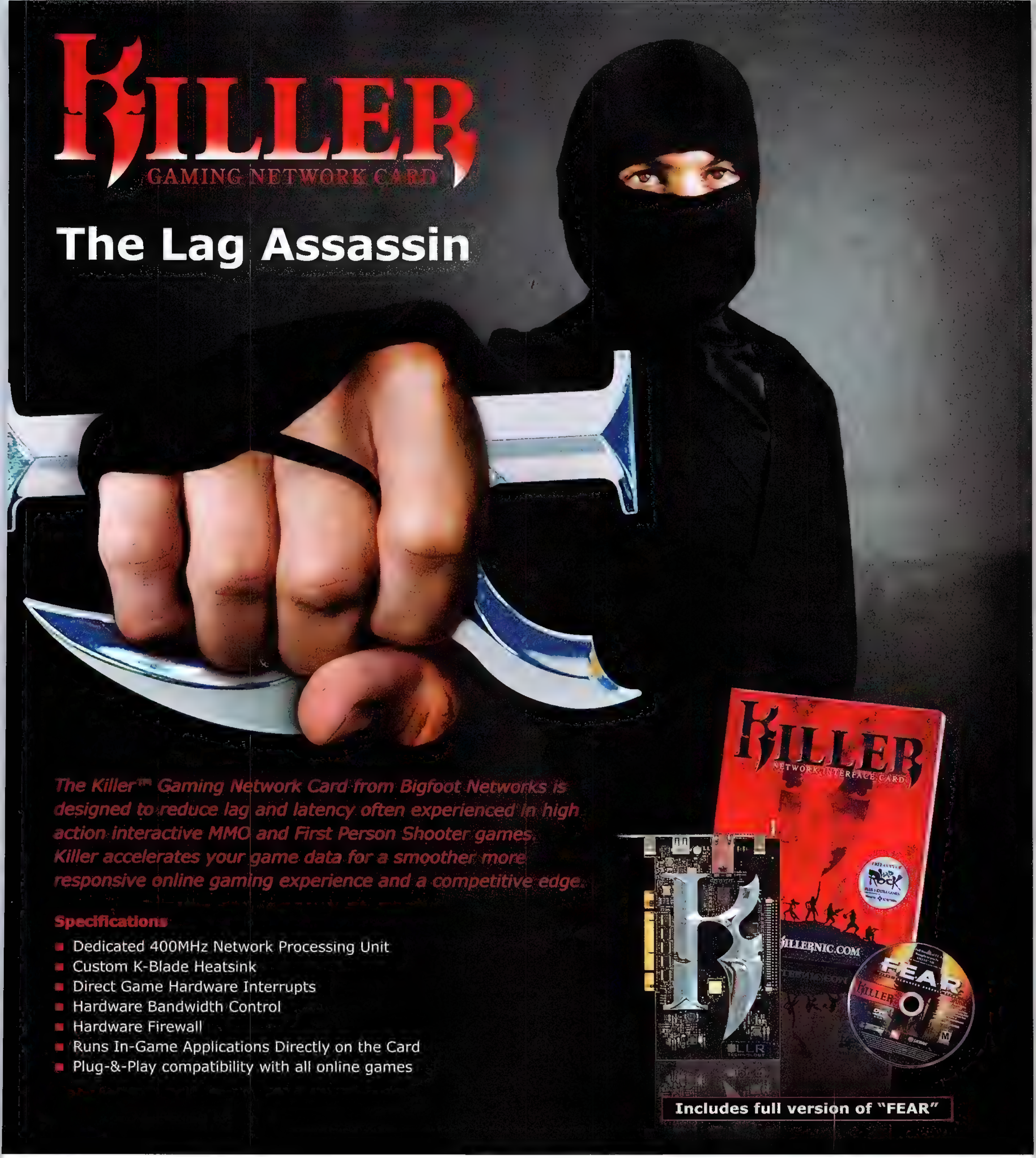


One culprit for a performance bottleneck is the rather old-fashioned hard drives. Though having two 250GB drives is a fine and dandy thing, you'd hope they'd run a little faster than 5200rpm. Not so. The two drives are also set up little atypically – while D drive is the full 250GB allocation, C drive has had the windows partition limited to 30GB. This might increase performance, but means you've got to be careful about where auto-installers put any large apps.

At least the games you can't quite play sound good while the action stutters along on screen, with the 4.1 speakers sounding far better than many we've seen come through the labs. Solid construction means you're not picking up any extra buzz or vibration off loose parts, either. The Y710-220 is, at least, a great machine to watch movies on.

Older games, especially anything using the Source engine, run quite nicely though, but the lack of high end performance leaves this a hard product to recommend for its intended purpose. True, it's not as expensive as some gaming machines we've seen, but that's hardly going to comfort if it falls over in a pool of its own body fluids every time you even show it the box *Crysis* came in.

SCORE 6.5 OUT OF 10



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TOMORROW'S TECHNOLOGIES – TODAY

NVIDIA ahoy!

Three days abroad and **Josh Collins** is bursting with information!

My Chippery column is usually a very easy column to write. During the month I get to torture the latest tech, drop in on press release events and on the odd occasion take a trip some place to, well, cover something or other.

This month, I went on a trip and covered something or other. This was a trip to Silicon Valley, California, to visit the folks at NVIDIA HQ and while doing so dropped in to check out the Corsair HQ.

Generally I come back with a sizeable amount of general tech info and industry whispers. But this time was different. This time, I came back with what can only be described as a metric crap load of info.

The most interesting point unfortunately is one that is still heavily under NDA – NVIDIA's new GPU.

With the card in hand but one hell of an NDA hanging over our heads, we won't be able to cover it until next issue. But rest assured, it will be very Atomic and worth the wait.

To keep us all entertained until then, both you and me, here's a sneak peak of what else went down at the NVIDIA Editor's Day event.

Besides the unveiling of the new GPU, NVIDIA had heaps to showcase within the realms of its CUDA; a C-based programming language, for all 8-series and above GeForce graphics cards.

> "...almost all of the games on show were demonstrating the use of PhysX physics acceleration..."

We saw CUDA used to do a whole fathom of awesome stuff. Some of this awesome stuff included the likes of physics acceleration, especially thanks to NVIDIA's recent acquisition of Ageia. Also shown was GPU accelerated real-time and near real-time animation by the folks at Natural Motion and how it is implemented into its new game *Backbreaker*, based around some seriously immersive American football.

It's not all about imitating and reproducing the real world though. We

saw how GPUs using CUDA and the card's massively parallel processing power can crunch some serious numbers. First was a demonstration from Elemental, the creators of a soon to be released video transcoder called RapiHD. Using the GPU, they demonstrated just how much quicker a GPU can be at transcoding H.264 Hi-Def video. And we're talking fast. How fast? About 20x faster… keep breathing, there's more.

As many in the enthusiast community will know, Folding@Home is a great distributed computing program used to fight the evil likes of cancer and hopefully, through some serious calculations, find a cure. Well, with CUDA and GPU acceleration, we could see this happen much sooner as the 'new NVIDIA GPU' (sorry guys!) can push out on average 500+ns/day of calculations – that's compared to averages of 170ns, 100ns and 4ns per day for a HD3870, PS3 and a 3GHz Core 2 Quad respectively. These are going to be folding monsters!

It wasn't all about general processing on the GPU though; there was obviously a heavy focus on new gaming technology and upcoming games.

We were privy to a showcase of tech demos and gameplay demos of upcoming super releases such as *S.T.A.L.K.E.R.: Clear Sky* and *Far Cry 2*, as well as the lesser known games such as the stunning *Nurien* (initial launch in Korea then translated for western demographics) and flashback modern day takes on classics such as *Bionic Commando*.

Furthermore, almost all of the games on show were demonstrating the use of PhysX physics acceleration using the new GPU from NVIDIA – we're in for another revolution people!

While the silicon continues evolving, thankfully the drivers are too. After a heap of code raining out of the R&D camp at NVIDIA over recent months, especially since the 'Big Bang' release late least year, it looks like there's plenty around the corner still to come.

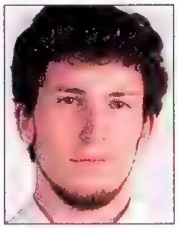
I had a chat with the head of driver development at NVIDIA and he mentioned some of the notable releases in the coming months include a 9800GX2 specific driver release for improved performance (perhaps we won't see another 7950GX2 white elephant), the 'Big Bang II' release set to let loose further performance from driver-based optimisations, as well as perhaps the most important release for many enthusiasts; multi-monitor support for SLI – about freakin' time!

Also on the driver front, the Ageia team believes a PhysX driver for the new GeForce GPU will be finished and available between late June and early July. Whether this also includes the 8- and 9-series GPUs that are CUDA capable was not entirely clear, though I assume so – we'll have to wait and see.

To round things out I had the opportunity to keep company with top overclockers and mates such as fugger, k|ngp|n and dinos22 as well as some great technical staff from NVIDIA and Corsair throughout the three days I was in the US of A.

Discussions in such circles can often revolve around upcoming tech. As such, Nehalem – Intel's upcoming new architecture – is apparently looking good with early engineering samples doing the rounds within very small circulations. Additionally, there's a potential new king in DDR3 memory with Samsung sampling a stock DDR3-2133 CAS 9 part – Corsair's on the case and says we could see retail products in a few months. Could this mean we may we see a flash back to the old DDR1 days of Samsung TCCD vs Micron BH-5?

My word limit's shot now, so stay tuned to **www.atomicmpc.com.au** for regular updates and these pages in future issues for coverage of these awesome tech advancements.



Josh had to have a lie down after writing this piece.
jcollins@atomicmpc.com.au

A>B>C>A!

Confused? You needn't be, with **Daniel Rutter** standing by to help.

Real Time Strategy games teach us many useful things about the real world.

RTS players know, for instance, that any soldier who survives for more than five minutes is incredibly lucky. And ammunition never runs out.

And the building known as a 'barracks' is a specialised machine which converts rare minerals into infantrymen.

But RTS, and other, games can also sneakily teach elements of logic.

So let's continue my occasional series on *How You Can Learn Everything About The Universe By Playing Computer Games*, with a little look at the world of non-transitive relationships.

In mathematics, a relationship is transitive if, whenever it relates A to B and B to C, it also relates A to C. If Albert is shorter than Betty, and Betty is shorter than Charlie, then Albert must be shorter than Charlie.

'Intransitive', or 'nontransitive', relationships don't work this way. And games of all kinds, from rock-paper-scissors to *Street Fighter*, are full of them.

Intransitive relations are the norm not just for individual units in real-time and turn-based strategy games, but also for overall game plans. If you choose to defend (turtle) then you'll probably beat someone who throws themselves into an all-out attack. If you all-out attack then you'll probably beat someone who's devoted themselves to expanding. But if you expand like crazy, you'll probably beat someone who turtles.

Fighting games are absolutely *riddled* with complex rock-paper-scissors relationships.

> "Fighting games are absolutely *riddled* with complex rock-paper-scissor relationships."

Intransitive relationships can emerge in more subtle ways, though.

Take non-transitive dice, for instance. Ordinary six-sided dice, numbered such that die B will on average beat die A, and C will on average beat B – but A will on average beat C!

This seems impossible at first glance, but it's not. Check out the excellent Wikipedia page on the subject for more information, and do feel free to return to this article after you've won a few hundred bucks down the pub.

Non-transitivity has great significance in the real world. It's natural for people to assume that all relationships with some vague sort of hierarchy are transitive, when they actually often aren't.

Suppose you would rather buy a V8 Commodore than a Camry, and would prefer an '82 Jaguar with a small-block Chevy to the Commodore, but would on balance rather have the Camry than the Jag. This does not mean that (a) you are crazy, or (b) there's no way to actually make a choice.

If you demand that all of your choices have transitive relations then you will indeed be completely stuck. But if you accept the choice as just being basically intransitive, you can go on to see if there's something else rational that can tip you one way or another.

In preferential voting, every voter expresses a simple transitive hierarchy of preferences. But it's perfectly possible for the *aggregate* preferences of all the voters to be intransitive – Kenneth Arrow won a Nobel Prize for figuring out just how ghastly this problem is.

Intransitivity is common enough in sport, too. Any statistics nerd can come up with plenty of rock-paper-scissors relationships between players and teams.

What this means – and it's extensible to a lot more than sport – is that the normal sort of tournament, where competitors are matched up in pairs and the winners of each match go on to the next round, can at best only tell you who deserved to win that particular set of match-ups.

The winner of a tournament is clearly *pretty* good, but there's *no way at all* to actually find the overall best competitor in any sort of adversarial competition with numerous participants. Well, unless it's some sort of arena fight where everybody plays at once.

And even then, you know that someone'll just complain about how two of the gladiators were turtling, and one of the other guys was flying planes off the edge of the map.

Good old dependable rock.

dan@atomicmpc.com.au

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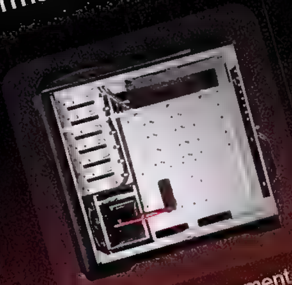

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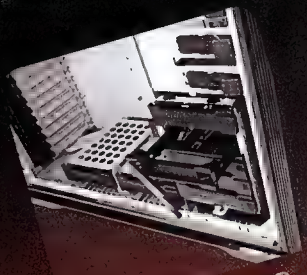

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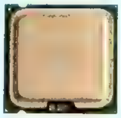
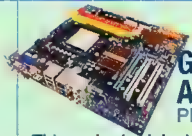
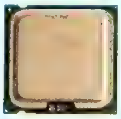
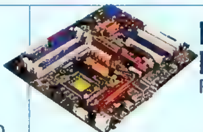
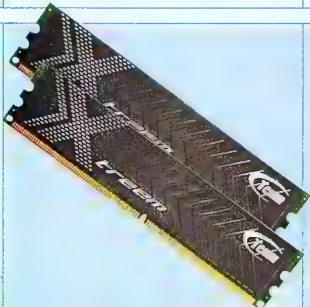
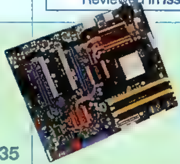
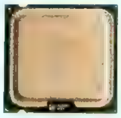
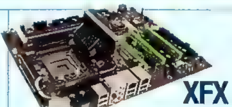
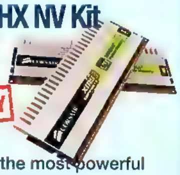
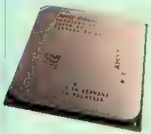
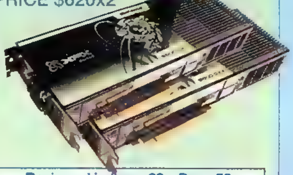
ATOMIC KITLOG

Our choice for the best gear the land has to offer

There's nothing sexier than new kit. And whether you need to horde your pennies (Budget), want the most power for your dollar (Performance) or own a small mansion and a collection of sports cars (Extreme), we're here to help with this handy matrix of *Atomic* recommended products. You may find your needs fall between categories – that's okay, just mix and match to suit your budget! Each piece of kit has been reviewed hands-on in *Atomic*, so if you want to learn more, look up the issue and page number listed.

		CPUs	Motherboards	Memory	Video cards
BUDGET *I can't afford to eat... gimme gear!*	intel	 **Intel Core 2 Duo** PRICE $100-$480 Stretch a little further and buy yourself a Core 2 Duo – you'll be thanking yourself later. The E4400 is the cheap ticket to speed, at $165.	 **GIGABYTE GA-G33M-DS2R** PRICE: $132 Using the G33 northbridge and has overclocking performance like its full ATX brethren, this Micro-ATX offering is extraordinarily hard to pass up. Reviewed in *Issue 81 – Page 52*	 **TEAM Xtreem Dark PC2-6400 C4** PRICE $80 Cheap, overclockable and good lookin' to boot. The modules fill the void that was previously left between cheap value RAM and enthusiast overclocking kits. Reviewed in *Issue 80 – Page 56*	 **GeForce 9600GT 512mb** PRICE $150 It's simple, it's black, and pumps out some pretty pleasing pixels for a very reasonable asking price. So far, easily the best of the 9-series. Reviewed in *Issue 87 – Page 43*
	AMD	 **AMD Athlon 64 AM2 X2** PRICE $135-335 Cheap CPUs are a wonderful thing, and the X2s are now wonderfully cheap. The 3600+ is your budget baby at about $85.	 **GIGABYTE AM780GM** PRICE $100 This mobo had Josh drooling and dreaming of the ultimate budget media center - not a state he often finds himself in! Reviewed in *Issue 89 – Page 40*		
PERFORMANCE *Hardware that bangs the best for buck.*	intel	 **Intel Core 2 Quad** PRICE $300-680 Core 2 Quad – a processing powerhouse, now affordable and overclockable like buggery. The Q6600 is the best buy, at about $240.	 **Foxconn P35 Mars** PRICE $236 A great board for the enthusiast with a mess of great ideas and good overclocking potential. Reviewed in *Issue 85 – Page 48*	 **TEAM Xtreem Dark PC2-6400 C4** PRICE $80 Cheap, overclockable and good lookin' to boot. The modules fill the void that was previously left between cheap value RAM and enthusiast overclocking kits. Reviewed in *Issue 80 – Page 56*	 NEW ENTRY **GeForce 9800GTX 512MB** PRICE $340 The 9800GTX manages to outperform both the 8800GTX and the ATI HD3870, which is no mean feat, and manages it at a fair price. Tasty. Reviewed in *Issue 89 – Page 49*
	AMD	 **AMD Athlon 64 AM2 X2** PRICE $135-335 The X2 series are still fantastic chips, and in the face of the Intel threat are now going for cheap. The 6400+ is your current sweet spot at about $190.	 **ASUS M3A32-MVP Deluxe** PRICE $242 True perfection in mobo form. Very well laid out and overclockable to boot. Reviewed in *Issue 85 – Page 51*		
EXTREME *Gimme power. Money is no object.*	intel	 **Intel Core 2 Extreme QX9770** PRICE $TBC The cream of the overclocking crop, based on the new Yorkfield architecture. Truly, Lord of the CPUs. Reviewed in *Issue 86 – Page 48*	 **XFX 790i Ultra SLI** PRICE $555 It's an imposing board that offers a host of enthusiast options, performance tweaks. We like. Reviewed in *Issue 88 – Page 40*	**Corsair DHX NV Kit** PRICE $900  NEW ENTRY All up one of the most powerful and versatile kits we've seen. Reviewed in *Issue 90 – Page 50*	**XFX 9800GX2** PRICE $620x2 Reviewed in *Issue 88 – Page 50*
	AMD	NEW ENTRY  **AMD Phenom X4 9850** PRICE $320 Sadly gets beaten by a mid range Core 2 Duo, but still the top of AMD's pile. Reviewed in *Issue 89 – Page 44*	 **ASUS Crosshair 2** PRICE $TBC Quite simply the new and leading kid on the block when it comes to AMD boards. Reviewed in *Issue 89 – Page 42*	 **Corsair Dominator Twin2X 10,000** PRICE $1016 Crazy speed sticks that will also happily do 1T/800MHz/3-3-3-3. Comes with a fan attachment to keep things cool! Reviewed in *Issue 77 – Page 58*	**XFX 9800GX2** PRICE $620x2  Reviewed in *Issue 88 – Page 50*

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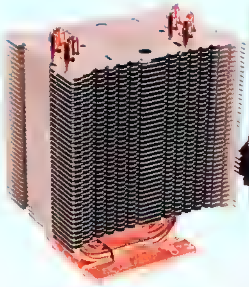

Noctua NH-U9B
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Reviewed in *Issue 89 – Page 36*

Thermalright Ultra 120 Extreme
PRICE $75

Tower cooling that will keep your tower cool. Whack a Nexus 120mm fan on for near silent cooling.

Reviewed in *Issue 89 – Page 33*

Thermalright Ultra 120 Extreme
PRICE $85

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Reviewed in *Issue 89 – Page 33*

Asetek Vapochill Lightspeed
PRICE $1020

Vapour phase change. Ooooh. Vapour. Phase. Change. No matter how many times you say it, it's still cool (pun!)

Reviewed in *Issue 64 – Page 38*

Coolermaster Aquagate Max
NEW ENTRY

PRICE $199

The ultimate in out-of-the-box water cooling solutions. For serious seriousness.

Reviewed in *Issue 90 – Page 36*

System drives

Samsung 200GB
PRICE $70

Super quiet and yet still fast, the 200GB Samsung offers excellent value for money.

Reviewed in *Issue 69 – Page 40*

Seagate Barracuda 7200.77 1TB
PRICE $300

Seagate's fancy new technology makes this beast both fat and fast. Mmm, toasty.

Reviewed in *Issue 69 – Page 40*

NEW ENTRY

WD 3000GLFS VelociRaptor
PRICE $399x2

Dear lord. The performance king hath cometh, short of whacking in a SCSI. Buy two and RAID 'em.

Reviewed in *Issue 90 – Page 52*

Displays

Samsung 931C
PRICE $323

2ms of raging colour gamuts and beautifully smooth tonality that will make you weep with joy and hug strangers.

Reviewed in *Issue 70 – Page 56*

Samsung 244T
PRICE $999

Brilliance at 24", the 244T offers 6ms gaming, a wonderful gamut and more inputs than an alien hooker.

Reviewed in *Issue 69 – Page 48*

Dell 3008 WFP
PRICE $2299

It's enough to make a grown man weep and beg. Or, at least, that's what we'd do for one of these simply gorgeous displays.

Reviewed in *Issue 88 – Page 59*

Speakers

Steelsound 5Hv2
PRICE $120

Awesome gaming audio performance on a shoestring budget. Phenomenal 'phones.

Reviewed in *Issue 73 – Page 43*

AVLabs AVL325
PRICE $165

While it can't hold a candle to the Z-5500D, with a price this low there's no excuse not to jump to 5.1.

Reviewed in *Issue 64 – Page 50*

Logitech Z-5500D
PRICE $363

Able to play the 'liquid gold' that is DTS 96KHz/24-bit, this 5.1 beast can wreck both home and hearing alike with equal impunity.

Reviewed in *Issue 48 – Page 56*

Cases

Lian Li PC-7S
PRICE $125

Quality, elegance, refinement and style. The trademarks of a Lian Li case, now available at an entry-level price.

Reviewed in *Issue 79 – Page 46*

Cooler Master Stacker 830
PRICE $285

Like the Stacker before it, this sensational Stacker stacks sumptuous specifications salaciously.

Reviewed in *Issue 61 – Page 36*

Silverstone TJ07
PRICE $348

The Silverstone Temjin TJ07 is a huge hulking beast that shows you mean business in the finest style. Impeccable finish and plenty of room means win.

Reviewed in *Issue 65 – Page 49*

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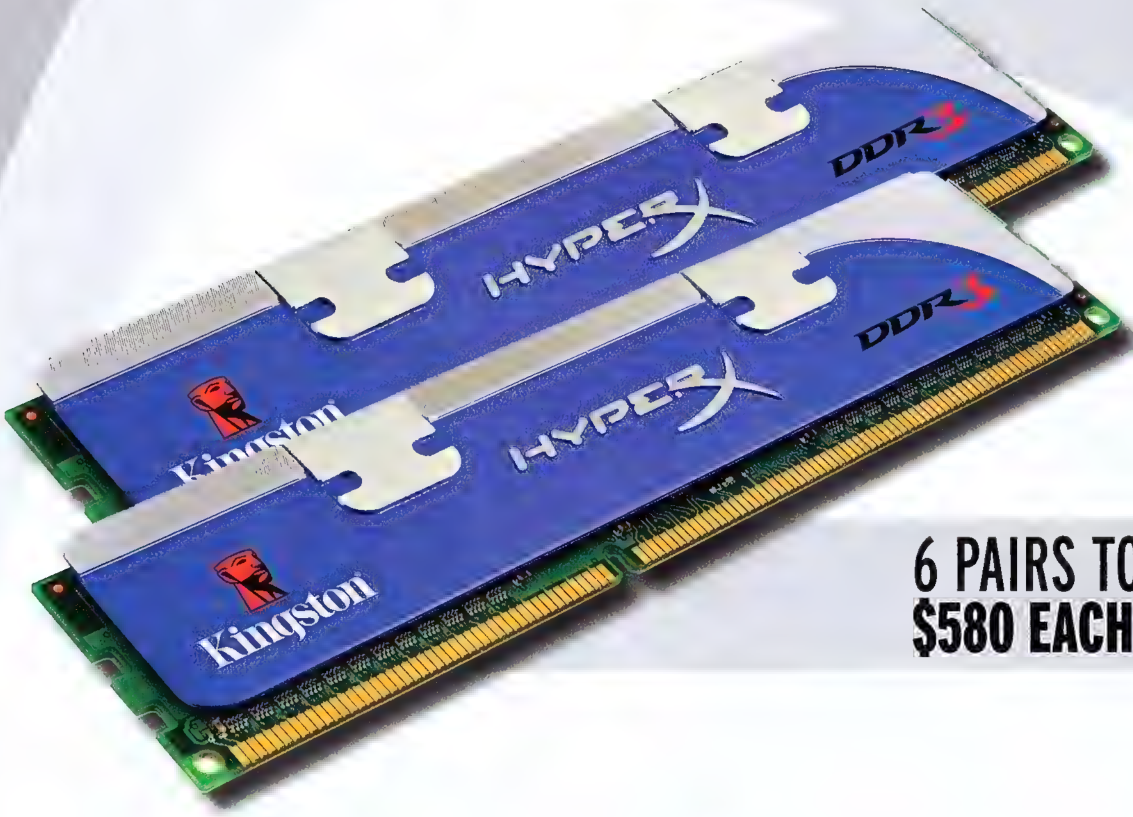

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Asus' new luxury laptop goes for gold

By Daniel Long | Mar 14, 2008 10:50 AM | 1 Comment

ASUS is considering 24 carat gold trimming for it's new Lamborghini notebook. We've seen a sample, and we're impressed.

NEWS

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By Daniel Long | Mar 14, 2008

Will VOIP chew up your download quota? What happens to get shaped?

REVIEWS > PERIPHERALS > CAMCORDERS

Sony HDR-SR8E

By James Morris | Mar 14, 2008

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GAMEPLAY

GAMES, GAMING AND GAMERS COVERED ATOMIC-STYLE

There's a little bit of everything in this month's gaming round up, for fans of every platform and nearly every type of game!

First up Logan Booker dives into a trench with one of the developers of the latest *Battlefield* epic, *Bad Company*, which will keep console combatants very happy.

PC hackers and slashers can find bloody amusement with our review of the opening days of *Age of Conan*, Funcom's latest foray into the MMO market. And BY CROM it's impressive!

Then, with the crack of whip and the doffing of our fedora, we take a look at the multiplatform actioner *Lego Indiana Jones*. If plastic blocks and cute depictions of the thuggee cult are your bag, oh boy. Over in PS3 land we venture into the mist with the shooter *Haze*, and then wander back out into the fresh air for a strategic consult with *Civilization Revolutions* on Xbox 360. Strategy? On a console? This is madness!

No.

This is Atomic.

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Stay away from Zara Baxter's breasts. Really.

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In good company

Logan Booker exchanges rifle fire with Karl-Magnus Troedsson, senior producer on *Battlefield: Bad Company*.

Battlefield.

To your average dictionary or English teacher, it's just two words fused to form a single, super word. Not that 'field' keeps up its end of the bargain, but 'battle', well, battle is one of those swell combinations of letters that paints all sorts of images in your head. Say, running courageously at an enemy encampment with nothing but a pistol and slice of toast; mining the crap out of your opponent's vehicle bay or shooting your teammates in a mad scramble to commandeer the map's only biplane, only to crash the thing in excitement five seconds later.

Okay, we're not talking about battles here, but the *Battlefield* series of games. Developer Digital Illusions CE (now EA DICE) single-handedly forged a new chapter in first person shooter history – the online-only, mass multiplayer FPS. It did it first with the original *Battlefield 1942* in 2002, then *Battlefield Vietnam*. *Battlefield 2* brought the series into the present, while the most recent instalment, *Battlefield 2142*, introduced futuristic elements. If you were to count the number of simulated battles that have occurred in these games combined, you'd have to be a million-fingered spawn of Cthulhu to keep track. What you don't need copious amounts of digits for is to recognise what facts all these games have in common.

They're PC and multiplayer only. There's a generation of console gamers out there that have yet to enjoy the sweet rush of *Battlefield* mania, and a generation of *Battlefield* players who've never experienced the title with a strong singleplayer campaign. EA DICE hopes to rectify both situations with its latest project, *Battlefield: Bad Company*.

Something different

"It's not so much a transition as it is an offshoot," explains senior producer Karl-Magnus Troedsson. "*Battlefield* was invented on PC and we'll never let go of this heritage, the PC still holds a very interesting proposition. However, offering the *Battlefield* experience to the millions of console players as well makes perfect sense."

EA DICE is quite adamant about the whole console thing, so PC gamers will have to skip this iteration of the game unless they buy an Xbox 360 or PS3. "This time around we've said no to a PC version and focused all our efforts on the console development to take this to another level."

You'd think jumping to consoles would be enough. But no, the developer has big plans for *Bad Company's* singleplayer campaign, a facet it has neglected in other *Battlefield* games.

"The story doesn't relate much to previous *Battlefield*

Expect a more character-heavy experience in this new Battlefield title. Also, expect to blow a LOT of shit up.

games as this is the first time we've done a true single-player campaign, driven by characters and a real story," says Troedsson. "In the game you play a new recruit called Preston Marlowe, who has just been placed in B Company."

Rather than being an elite squad of crack commandoes, B Company contains the US Army's "misfits, troublemakers and general screw-ups". That doesn't stop the army from assigning B Company dangerous missions – not because it thinks you can complete them, but more that it doesn't care if you return or not. Hey, if you can accomplish some good in the process, the army has come out on top.

Of course, B Company doesn't take kindly to being sent on suicidal adventures. Along with his new-found mates Haggard, Sarge and Sweetwater, Marlowe decides it'd be better to desert than cop it sweet from high command.

"When the opportunity arises to pursue a large cache of black market gold, horded by a ruthless mercenary, they decide it's time to stop following orders and go AWOL," says Troedsson. "Sometimes the gratitude of a nation isn't enough."

Got class?

No *Battlefield* game would be complete without classes and weapons. *Bad Company* is no exception.

Players will be able to choose from the following fields: Officer, Assault, Demolitions, Support and Sniper; and firearms will include .45 calibre pistols, M203 grenade launchers, mines and more. Sounds like your standard array of roles and weapons... except you'll be able to use them in a fresh new

way – total destruction of the environment. This is thanks to EA DICE's Frostbite engine, designed in-house by the developer.

As with more recent *Battlefield* games, players will have to unlock weapons before they can access them. Most however can be gained via the campaign.

Okay, so we know the focus is on singleplayer. Does that mean there's no multiplayer at all?

"*Battlefield: Bad Company* is true to its heritage by including a full online experience as well as the offline campaign," explains Troedsson. "This is a very important part of the game and anyone that enjoyed the previous games should be very pleased with this new installment." In short, we have nothing to worry about. In fact, *Bad Company* comes with an entirely new multiplayer mode called 'Gold Rush'. It's a 'defend and hold' style game mixed with objectives. Attackers must destroy the defending team's caches of gold, which provides access to more areas of the map, as well as additional reinforcements.

"The general idea with it is to keep the action in the game closer together, not spreading all the players thin around the huge maps which often happened in the old Conquest mode," say Troedsson. Fans of Conquest mode have no need to cry – it will be accessible via a free download post-launch.

Ah, the noble and ancient art of tank-sniping.

> “The general idea is to keep the action in the game closer together...”

Frostbite, the good kind

EA DICE has always been possessed by the need to craft its own technology. Frostbite, the engine that underpins *Bad Company*, is completely proprietary and will make its first appearance in the developer's console debut. With the popularity of Unreal Engine 3, Gamebryo and other options, why is EA DICE obsessed with building its own tech?

"Developing a new engine isn't a cakewalk and every company going down this road really needs to ask themselves why, especially today when there are proven engines available for licensing," warns Troedsson. "Our reason was that we really wanted to create a cutting edge game that made the most out of the next-gen console's hardware. In order to do this while at the same time innovate with things like destruction, creating our own engine was the natural choice."

Troedsson also says that the known hardware of the Xbox 360 and Playstation 3 has made this process easier. The team started work on the Xbox 360, but over the last year or so most of EA DICE's efforts have been pumped into the PS3 version. Both platforms provide impressive hardware for the game to operate on, even if Sony's console threw the developer a few curveballs.

"It's just a matter of harnessing that power and making the most of it. This can be very different when comparing to previous instalments of the platforms. Working with parallel

processing on the PS3 has been a challenge but it also opens up some great opportunities."

Overall, it sounds like the jump to the loungeroom systems has been smooth, if not beneficial.

Perhaps the biggest compromise EA DICE has had to make is on the modding side. This deficiency has been offset by beefing the multiplayer support by adding persistence for awards and medals, leaderboards and unlockables.

"On top of all this we'll supply even greater insight to player performance on the homepage, where additional stats and comparison tools will be available," adds Troedsson.

Going for gold

Battlefield: Bad Company should be available by the time you read this, and a demo shortly before, so we'll have ample opportunity to judge EA DICE's transition from PC for ourselves. For those in doubt, Troedsson says if you like *Battlefield*, then *Bad Company* won't disappoint. Throw almost totally destructible environments and the series' reputation for stunning visuals, and the game is a tempting proposition.

"Players who go deep will also notice that it definitely changes how you play shooters and introduces another tactical layer to the sandbox experience."

ALL ABOUT OPTIMISATION

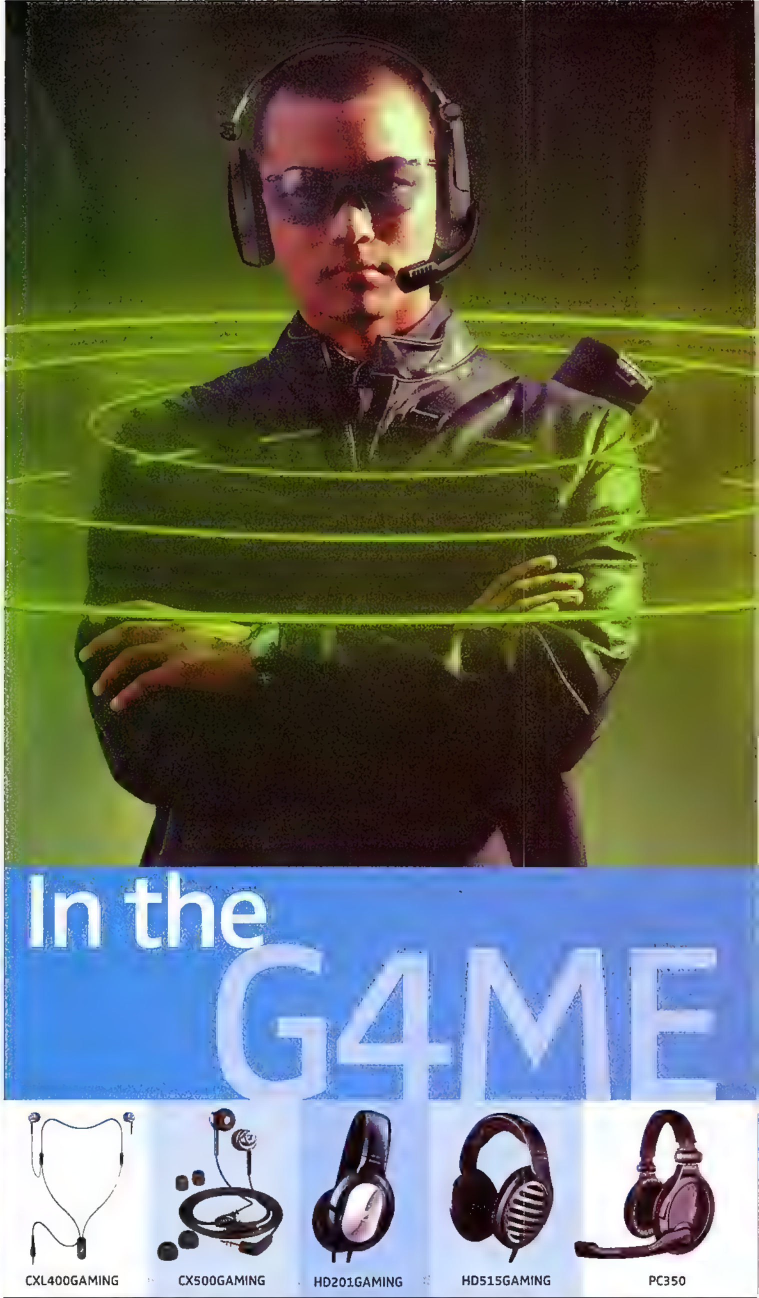
Part of the development process involves optimising the content – it's just as important as creating code and assets. Troedsson was able to provide us with some insights into how EA DICE deals with space and performance issues by tweaking its games.

Thanks to the known hardware of the consoles, the developer has been able to take its foot off the pedal on the optimisation front for *Bad Company*. Troedsson notes that usually it's a crucial aspect when dealing with a new engine.

"In order to get to the final result we need to work with all areas, squeezing out every little piece of power of the hardware. Usually we start with overall optimisation of the code, like looking and rendering, physics, sound and AI. When they start to hit the limit of how much more performance we can dig out, we move over and optimise the content, scaling down on the amount of trees on a level or the amount of polygons on the environment."

This deals with performance, but how about getting all that data onto a DVD or Blu-ray disc?

"If optimising for pure size on the medium we ship on we most likely would optimise by removing content e.g. scaling down quality of movies or removing entire maps/missions. But there are other things as well. Usually we try to squeeze as many localised version of the game onto the same disc, especially here in Europe. If the increase in manufacturing cost could be handled, these could be broken out to several discs and this would free up a lot of space."



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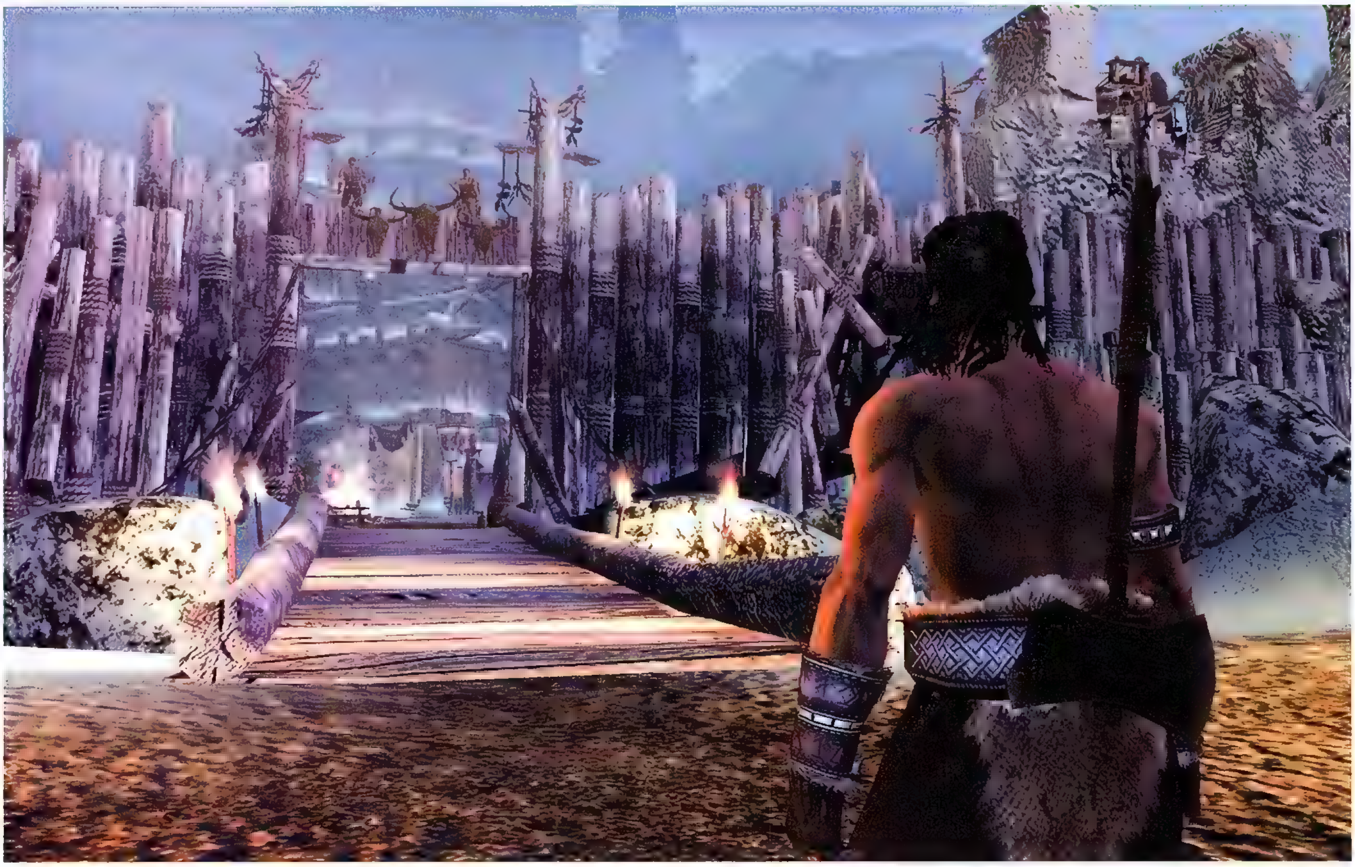


Age of Conan

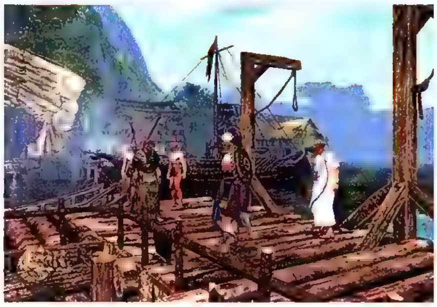
David Hollingworth dons sandals and a loincloth to play this latest hack and slash MMO. Crom!

"Between the time when the oceans drank Atlantis, and the rise of the sons of Aryas, there was an age undreamed of. And unto this, Conan, destined to wear the jewelled crown of Aquilonia upon a troubled brow."

For a lot of people, those words are as evocative as Tolkien's ring poem or the opening line of Star Wars. Robert E.Howard's Conan novels languished for many years as a pulp curiosity, but recent years has seen a revival of the writer and the re-evaluation of his skills. Now, more people than ever before are going to be introduced to the world of Hyborea thanks to Funcom's epic new MMO, *Age of Conan*.

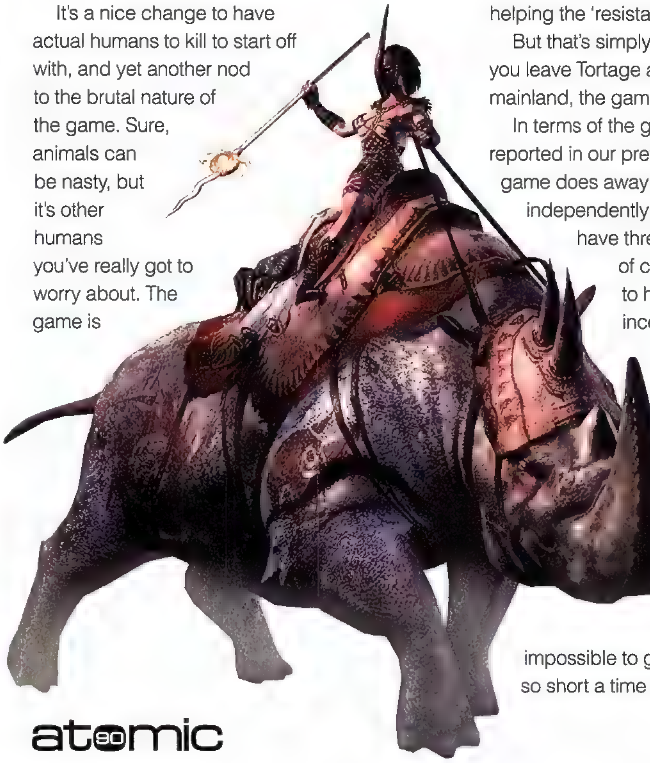
The first impression of the game is during character creation, and it's a brutal one. You start as a slave on a galley, and this forms the backdrop for fine-tuning your toons look and class. In a particularly neat nod to the feel of the books, male characters are created against a backdrop of the oardecks, while female ones see the camera sweep into the captain's cabin, where he keeps his better looking merchandise…

In sticking with the low-fi background of Conan's gritty pre-dark ages world, there are no races to play other than human. Instead, you get three nations to choose from – the evil Stygians are a subtle race, and they have access to Rogue and Mage style classes; Cimmerians are the classic barbarians, and can choose from Warriors, Rangers and Rogues, while noble Aquilonians enjoy a slightly more balanced selection of class choices. The four major class groups are broken further into sub-classes, too. Assassin, Ranger and Barbarian are all Rogue classes, for instance. The developers have paid a lot of attention to the source material, so there are three very distinct priestly classes per 'race', and only Stygians can play any of the Mage classes. It may seem a little random if you're not familiar with the books – or movies, for that matter – but it certainly makes for flavourful play.



The rest of creation is just as meaty. You can take control of pretty much every facet of how your character looks, from the size of your mighty thews to the immensity of your heaving breasts. It's a robust system, and whether you simply like clicking through random combinations of measurements or fine-tuning to get the she-rogue of your dreams, you'll come away with something just right. You'll also get a taste of some of the excellent texturing the game has on offer in the graphics department. With a bit of tweaking in the graphics settings, this is a stunner to look at.

From there, you're thrown straight into the story – none of this running about newbie zones killing half-dead diseased cats for the mighty heroes of Hyborea! After a slightly confusing cut-scene that is thankfully too short to leave you scratching your head for too long, you wash up on the shore of an island following a shipwreck. After rescuing a requisitely scantily clad woman strung up to a tree, you've got to cut your way through pirates, poachers, picts (that's a lot of 'p's -*ed*) to get to the nearest city.



It's a nice change to have actual humans to kill to start off with, and yet another nod to the brutal nature of the game. Sure, animals can be nasty, but it's other humans you've really got to worry about. The game is also a private instance for the first five or so levels, until you make it to the pirate city of Tortage.

Games like *Lord of the Rings Online* have made good use of instancing to advance an MMO's plot, but *Age of Conan* takes it a step further. You can choose to adventure during daytime, and do all the usual environmental quests – get this, kill those, etc – or you can adventure in the evening, which is another private instance, and features quests related to the over-arching plot of the early game, namely, overthrowing the evil bastard who is running Tortage.

It's a well thought out system that allows you to both be the lone hero of your story, and still get out into a living world with fellow adventurers. However, it doesn't always gel with the outright evil nature of some of the character classes; this is not a game with a neutral split, like *WoW*, where both sides think they are right. In this game, nearly every race has access to evil characters, and the Stygians are downright pitiless. Why, then, they would want to go about rescuing orphans and helping the 'resistance' is a little beyond us.

But that's simply the early game, and once you leave Tortage and the Barachan Isles for the mainland, the game opens up a lot.

In terms of the gameplay mechanics, as we reported in our preview (in our March issue) the game does away with auto-attacks that trigger independently of the player. Instead, you have three basic attacks and a range of combos and special moves to hack, maim and generally inconvenience your enemies. Combined with the active defence system, where each enemy or player can choose which of three directions to defend, and how vigorously, it pays to pay a lot of attention in any fight, and adjust your attack and defence to suit.

It's early days yet, of course, and it's nigh impossible to give any MMO a final score over so short a time at the keyboard. But by now we've tried out a range of characters up to the end the Tortage sequence (to about level 20 out of a possible 60) and it's been a fun experience. Assuming the population, and eventually the economy (as of writing, the game's auction system is offline for bug-tracking), can continue to grow from launch, it's looking like *Age of Conan* has a rosy future ahead of it.

For regular updates on the progress of the game, check back in a month's time on our site (**www.atomicmpc.com.au**) to see how we're finding the game.

PC

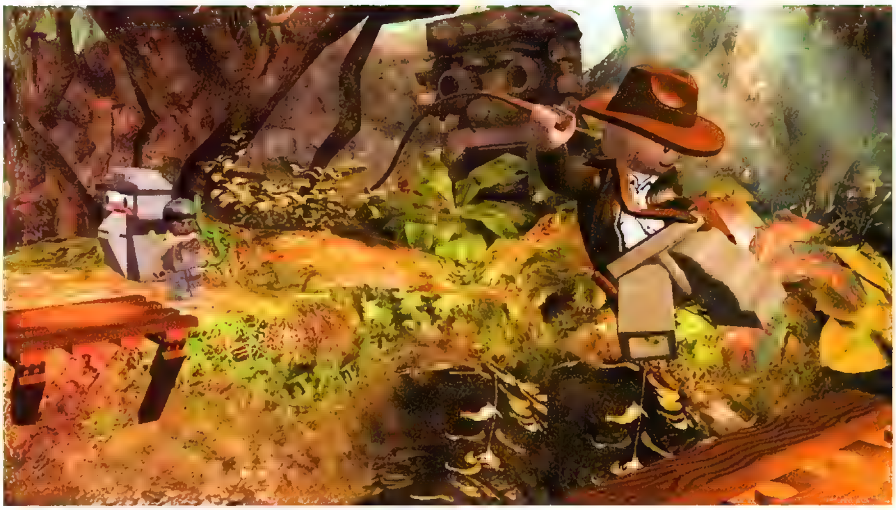
Developer **Funcom**
Publisher **Atari**
Website **www.ageofconan.com**

VERDICT

Character creation; involved combat; uniquely gritty. ✓

Some launch issues; mature content not suitable for everyone. ✗

7.5 OUT OF 10



Lego Indiana Jones: [Preview] The Original Adventures

Is the first building block (see what we did there?) in a whole new Lego franchise? **David Hollingworth** cracks on to find out.

Reviewer's note

Okay, I've got to break out of our communal *Editorial Voice* here to make a possibly damning confession. I may in fact be the only human alive to be left utterly cold by the various *Lego* titles that have assaulted pretty much every platform under the sun in recent years.

Everybody else in the office thinks they're a hoot, and I drew a small crowd while playing through the latest *Lego* game, which this time mines the rich soil of the Indiana Jones trilogy. Everyone else was very amused by Lego Indy's bouncing adventures, but all I could manage was a bitter bah-humbug.

You have been warned…

On with the show!

To be brief, we could sum up this game by simply calling it *Lego Star Wars* with a Fedora. But then you'd be done with the review by now and wondering at all the white-space on the page. However, that's also the most accurate way to describeit, as it really doesn't bring anything new (apart from the hat) to what's already been established in previous *Lego* titles.

This is great if, like the majority of both casual and hardcore gamers, you loved what's been before. If you hated them, and are simply hoping that Indy-in-blocks makes it all worthwhile, prepare to be disappointed.

Present is all the usual blasting of flora and fauna to earn blocks, blasting of flora and fauna to renew health, and of course the blasting of aforementioned flora and fauna for no other reason than they are in your way. As the pretty colours swirl around the screen, you'll also be called upon to solve any number of Rube Goldberg-ian puzzles and contraptions and leap about what are essentially platform puzzles. To do this you'll need to swap between the various characters on screen, watching your little Lego soul waft about like something from a bad B-movie.

Once you're through the more introductory levels, some of the puzzles get downright fiendish in their complexity and the kind of multi-tasking you'll require. One new wrinkle is the fact that each character comes with a phobia of sorts – Indy hates snakes, Willy hates spiders and so on. Juggling those, and each character's unique abilities can actually be quite engrossing.

However, the real 'treat' in the game is discovering how Traveller's Tales has translated the often gritty and sometimes bloody world of Indiana Jones into family-friendly Lego fare. For instance, the first fifteen minutes of Raiders of the Lost Ark has a body count higher than practically any other film in the series. People are shot, poisoned, burned, trepanned and whipped to violent deaths, and that's before the movie has barely started.

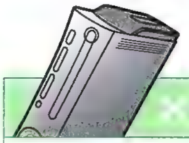
Unsurprisingly, the game turns it all into a bloodless and cutesy joke-fest.

Case in point would be the death by heart-plucking and lava-dunking that sets the tone for the second act of Temple of Doom. In Legoland, that simply becomes a vicious taunting followed by the poor nameless slave getting an awkward-looking tan in Siva's solarium from hell.

Which, we guess, is kinda funny.

In effect, that pretty much sums up the tone of the game right there. It's a no brainer that this is going to be as popular as the Star Wars games, and likely lead to a Lego version of The Crystal Skull to boot. Great news if you're a fan.

Woo!



XBOX360

Developer	**Traveller's Tales**
Publisher	**Lucasarts**
Website	**www.lucasarts.com/games/legoindianajones/**

VERDICT

Bright & cheerful; easy controls; tongue-in-cheek. ✓

Overly simplistic take on one of the greatest action sagas ever made. So there. ✗

ANTICIPATION RATING

7.0 OUT OF 10

Haze

A great idea is lost amongst less than great gameplay. David Hollingworth takes another hit of Nectar for the team.

The humble First Person Shooter is one of those iconic gaming genres that is at one and the same time an essential part of PC – and now console – gaming, while also constantly hyped as being a dying breed. *Haze*, on PS3, tried very desperately to bring some freshness to the run and gun mix, but only serves to offer up another nail in the coffin-sized arsenal of the naysayers and doomtalkers of the gaming world.

The real tragedy of *Haze*, however, isn't how poor the game is, but rather how good the idea behind the game actually is.

You play Shane Carpenter (probably the most boring name in gaming history), a soldier in the employ of Mantel Global Industries. Mantel is in the middle of putting down some kind of local revolution in some un-named generic location. It's pretty much a cookie-cutter plot straight from the Big Book of Plots, but the twist – and a pretty good one at that – is that Mantel not only specialises in manpower, but in chemical research. To that end, its soldiers are equipped with a drug called Nectar. It boosts combat performance and cheers you up no end, making for happy and effective killing machines.

You get introduced to the idea of using the drug regularly early on, and the fate of an NPC who isn't comfortable with the drug is actually quite intriguing. The banter of your squadmates is collegiate at best, but then again they're high as heavily armed kites. All up, the first five minutes of the game sets up a rather disturbing state of paranoia, as you blast hit after hit of the drug and watch your pals yuck it up.

At this stage we got our first taste of combat, which was pretty lame. Once you Nectar up, it's pretty much a turkey shoot, and apart from being able to play dead, the enemy AI isn't all that clever. What's more, we thought at first, the engine couldn't even handle persistent bodies – they faded away after each gunfight! As the game continues, though, you start to get the feeling that what you're seeing – and hearing – in your drugged state, may not actually be the real world, but rather a sanitised version of it to keep soldiers happy and killing.

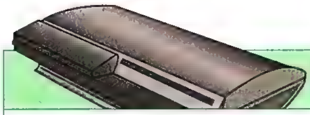
Unsurprisingly, you eventually go over to the rebel side to take down the evil mega-corp, and you have to learn a whole new set of skills to take on your old comrades. Unfortunately, however, by that stage you may not care, as the game pretty much sucks.

The combat seems remarkably anaemic, even once you get off the wonder-drug Nectar. The AI plays a big part in this, as badguys seem to stumble toward you without really using the plentiful cover on the battlefield. Nearly every fight can simply be ended with ease by flanking the enemy. The weapons feel samey, even though you're introduced to a wide range early on, and don't get us started on the driving levels. It's as if someone played through *Halo*, and then turned around to the dev team and said "Hey, let's make that, but with less time and effort!"

The game's engine, developed in-house by Free Radical – and really, there are people there who should know better – doesn't help things either, rendering scenes in fits and starts and simply not up to the kind of detail and mood the game aims for.

It's a small mercy that the game is also too short, and that the multiplayer is an afterthought, then.

Ultimately, *Haze* is very obviously a once-ambitious project that fell into development hell a year or so ago and has never really struggled out.



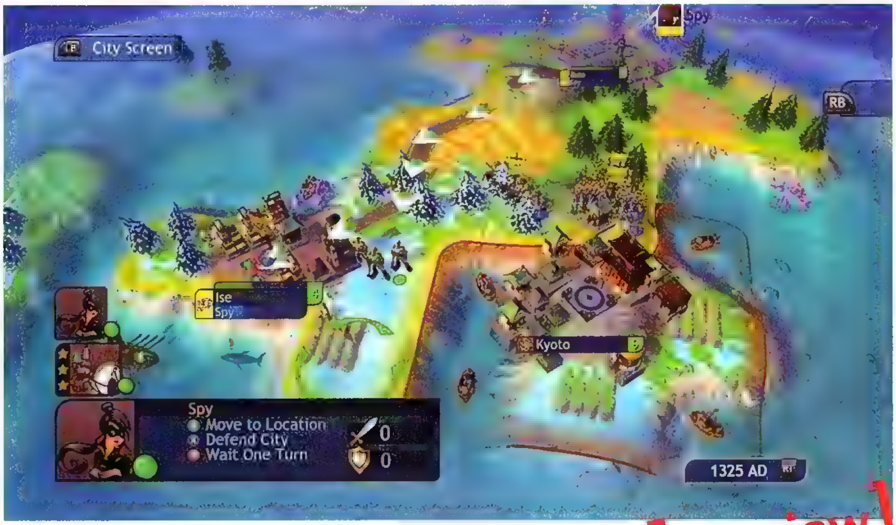
Developer	**Free Radical Design**
Publisher	**Ubisoft**
Website	**http://www.hazegame.com/**

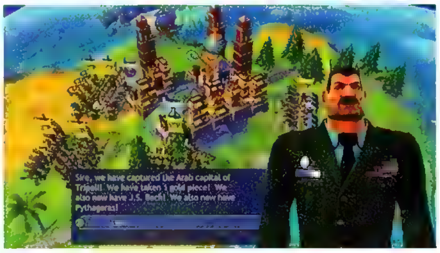
VERDICT

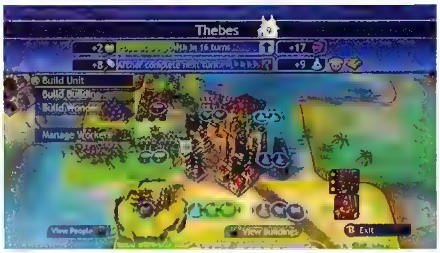
Intriguing use of combat drugs. ✓

Poor graphics; clunky overall plot; derivative gameplay; bad Korn music video. ✗

5.0 OUT OF 10




Sire, we have captured the Arab capital of Tripoli! We have taken 1 gold piece! We also now have J.S. Bach! We also now have Pythagoras!



[Preview]

Civilization Revolutions

It's Civ, Jim, but not as we know it – not as we know it.

There are some combinations that seem made in heaven. Coffees and cream; Bogart and Bacall; crack addiction and nasty sores. If ever any creationist wanted to make a case for Intelligent Design, this is where they should be starting. Another of those classic and perfect combinations would have to any *Civilisation* game and the PC. Right?

Well, once upon a time, maybe, but *Civilization Revolutions* is making a good case that *Civ* may well match up perfectly with – of all things – the Xbox 360, PS3 and Nintendo DS.

Yes, I'm sure that, as we just printed those words, a tumult of Alderaanian proportions just cried out in one anguished voice. And yet, our hands cramping from a couple of mammoth *Civ* sessions, we're very pleased to say that the naysayers may well be quite wrong. *CivRev* is classic *Civ* given new, albeit cartoon-ey life.

At first glance, it really does feel just like *Civ* on a PC. You've got 16 cultures to choose from, each with their own exaggerated and most 'typical' leader, such as Abe Lincoln for America and Cleopatra for the Egyptians. You start each normal game with one Warrior unit and a Settler unit, which is more or less in the best spot to start a city anyway. From there, it's classic stuff all the way. Expend your nation, conquer Barbarians, negotiate or open hostilities with other nations, and research away on the tech tree.

If you've ever played any of the previous games, you'll be able to settle down to *CivRev* and get stuck right in, but even newcomers should be able to pick up the game quite quickly thanks to some very important differences.

For one thing, a lot of the micromanagement that used to plague PC users, such as unrest, pollution and so on (I will not miss those civil uprisings one bit *–ed*), is gone. This streamlines play immensely, and it's not something that even a veteran player will miss. Similarly, most of the maps are far smaller, and the average game in this version is designed to play out over hours, not days. That might leave a few purists grumbling, but the heart of *Civ* gameplay is intact.

The biggest change to the series is in the remarkably cartoony presentation. Cities are bright with colours and exaggerated angles, advisors caper around the screen sprouting gobbledygook that would make a telly-tubby look smart, and everything just seems that much… cheerier.

We've not yet gotten to nuke a neighbour, so we can't wait to see how they turn atomic holocaust into a charming laugh-fest.

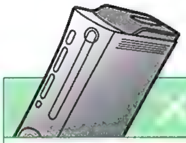
This exterior mood may well turn a lot of people off, and it does at times make it difficult to achieve that old state of *Civ* nirvana, where you lived and breathed with the pulse of your chosen nation. Pay closer attention, however, and you'll notice that while you may not be able to look up all the usual level of detail on the older PC version, the overblown style of the art in the game actually allows game details to be translated visually.

When a unit dings up to Veteran status, it goes from looking like a grunt to looking like a hardcore soldier. Similarly, the posture and behaviour of your neighbours is a good indicator as to their own confidence and status.

Plus, watching your own advisors push each other off-screen as they fight over what upgrade is best for your empire is a guilty kind of pleasure, but a pleasure nonetheless.

Multiplayer is of course still up in the air, but we can presume that with good Xbox Live support there's no reason that *CivRev's* online play will not be any less engrossing as Civ4's, which has eaten more than a day or five of our life as it is.

If you can ignore – or even better, embrace! – the new look of the game, *Civilzation Revolutions* has a lot of offer stalwart fans and neophytes alike. In fact, we expect that it will serve as an excellent bridge for people who have been playing since *Civ 1* to bring a whole new generation of generals into the fray. And we have to ask, can you ever really get tired of burning Washington to the ground?



XBOX360

Developer Firaxis
Publisher 2K Games
Website http://civilizationrevolution.com/

VERDICT

✓ Streamlined gameplay; clean interface; as addictive as ever.

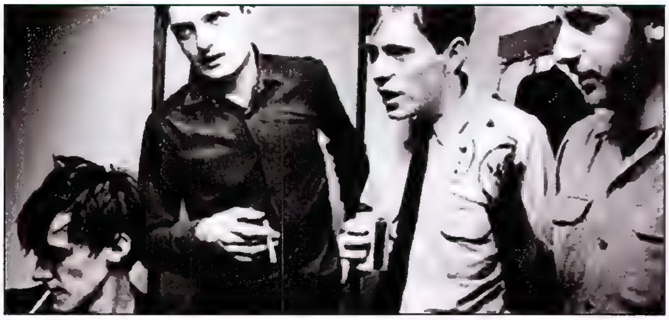
✗ Might be too cute; you'll never write the great novel of our time while playing Civ.

ANTICIPATION RATING

9.0 OUT OF 10

CULTURESHOCK

Everything you need to know about geek film, music and literature.



Joy Division

DVD Directed by Grant Gee
Starring Bernard Sumner, Peter Hook, [illegible], [illegible], Tony Wilson
Distributed by Madman Entertainment

Hot on the heels of Anton Corbijn moody bio-pic Control, comes this excellent documentary exploring one of the most important bands of the post-punk explosion – Joy Division. Combining rare footage with candid interviews with surviving band members and other important figures from the band's too-brief career, this is a thoughtful, moving and well put together film.

The movie covers the band's history from its roots in a run-down Manchester to the sad death of the band's lead singer, Ian Curtis. In fact, the city of Manchester is almost a central character, as its revitalisation began with the forming of Factory Music, the label that produced Joy Division, and later New Order and other Manchester-sound luminaries.

Director Garry Gee shoots the movie in a very simple style, adding flourishes only where necessary, like in the case of Ian Curtis' wife, Deborah. She does not appear in the movie, but quotes from her biography are written on the screen that are just as eloquent as any of the interviews.

Ultimately, however, it's the music that says the most about the band, and there is something to be said for being able to listen some of Joy Division's best work in the context of this documentary. After hearing from the bandmembers, and the people who called Ian Curtis a friend and lover, you cannot help but take away even more from these great songs.

If you're not that familiar with Joy Division, though, the movie will either be an eye opener, or bit of bore. Regardless, it's a fascinating exploration. **DH**

score **8.0** OUT OF 10

Indiana Jones and the Kingdom of the Crystal Skull

MOVIE Directed by Steven Spielberg
Starring Harrison Ford, [illegible]
Distributed by Paramount Pictures

The latest Indy flick starts with a hot-rod barrelling across country, before the rockin' hot-rodders find some tarmac and a US military convoy to drag off while Elvis Presley plays loud and true. It's odd territory for an Indiana Jones film, but given the series has always been about bravura openings, it's a vivid way to cement the film's 50s setting in the minds of viewers.

The movie really only slows down when it's necessary to advance the plot, introduce a new character or raise the dramatic stakes. And even when some of those plots, characters or gimmicks might be a little laboured, the next chase/fight/pratfall kicks in and the movie ramps back up to full speed. It's a classic B-movie trick, and given its B-movie roots, not at all out of place or disappointing. Still, the movie hits far more often than it misses.

At the end of the day, there's only one way to describe Kingdom of the Crystal Skull – it's a hoot. It never makes pretence of being serious cinema; it's unashamedly about entertaining the audience. If you're willing to meet the movie half way, you will not be disappointed. (For a full review of this film, check out **www.atomicmpc.com.au**) **DH**

score **8.0** OUT OF 10

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Geek dating 101

Want to know how to get some dork on your fork?

Some time ago, a male friend suggested that I do a Geek Chic column about how to talk to women. I think I may have frozen, with a terrified look on my face. After all, it was just like that moment every geek dreads; when your aunt/uncle/relative comes up and says: "We need to buy a new computer, what should we get?"

They expect that there's one single answer. One perfect computer that is equally awesome for every family, hobbyist, enthusiast, businessperson, overclocker, vidder, gamer and graphic design professional out there.

Okay, you can stop laughing.

There's no perfect computer, and there's no generic guidebook on how to talk to women. You need specific advice tailored to your personal needs. But at least computers come in a limited selection, whereas there are approximately 3 billion separate specifications for women. I can't help much in 700 words.

> "There's no perfect computer, and there's no guidebook on how to talk to women."

Lest you think I underestimate the diversity of women, even if we're only considering geeky women, allow me to direct you to a massive blogsphere slapfight.

The furore started when a chap called 'theferret' on livejournal posted about what was, in all probability, an endearing and charming event between friends at a science fiction convention, called the Open Source Boob Project.

"This should be a better world," a friend of mine said. "A more honest one, where sex isn't shameful or degrading. I wish this was the kind of world where I say, 'Wow, I'd like to touch your breasts,' and people would understand that it's not a way of reducing you to a set of nipples and ignoring the rest of you, but rather a way of saying that I may not yet know your mind, but your body is beautiful."

We were standing in the hallway of ConFusion, about nine of us, and we all nodded. Then another friend spoke up.

"You can touch my boobs," she said to all of us in the hallway. "It's no big deal."

(You can read the rest in all its glory at **http://theferrett.livejournal.com/1087686.html**, although you'll have to skim past his backpedalling disclaimers and updates at the top of the post.)

The idea of the OSBP was that people would wear a badge that indicated their participation in the project, and their willingness or not to have their breasts touched (or butts, in the case of guys). It is in no way 'Open Source', since there was no handing over of DNA for recombination into your own compiled set of breasts. But I digress.

I imagine that a great many of you right now are saying "Hell, yeah!" and "Where's the nearest science fiction convention," but let me bring you back to my point about diversity.

Theferrett's suggestion that this was a nifty idea that should be expanded to all science fiction conventions opened him up to critique from everyone and their dog.

Reactions ranged from Lori Selke's pointed comment that "I do not gain empowerment or self-respect or enlightenment from your gaze, much less your sweaty little palm." through to the thoughts of anotherjen, who was far more accommodating: "As far as I'm concerned, all my friends can touch whatever part(s) of me they choose, through clothing. Without clothing would have to be negotiated, but I'd be pretty generous there too."

The diversity of response in the 1300 comment thread that theferrett's post spawned should give the lie to the idea that there's any one way to talk to women. Even geeky women. Even about touching their breasts in public. And if you're not convinced, there's always the rest of the blogosphere's response to really hammer home the point.

When it comes to advice on how to talk to women, I can't provide anything more than "go read internet slapfights" or the usual clichéd-but-true suggestions to develop confidence, enjoy your own company and relax. After all, women are people too, with exactly the same fears, desires, worries and concerns as most guys, up to and including whether or not we should spend the night installing the new graphics card or hanging out with the new boyfriend/girlfriend.

And yeah, sometimes the graphics card wins.

Zara Baxter loves to play the part of agony aunt, but would prefer you don't touch her boobs. Send your geek-related dating problems to **zbaxter@epcauthority.com.au**

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TECHNIQUE

HANDS-ON TUTORIALS FOR THE TECHNICALLY INCLINED

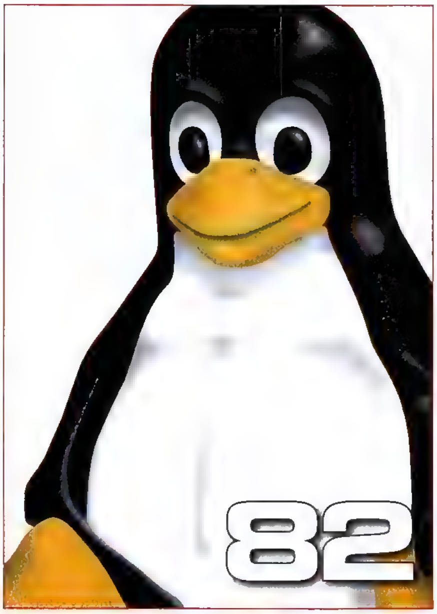
It's a time of endings and beginnings this month, as one project comes to a spectacularly successful conclusion, and another tutorial takes its first steps into the world of Atomic-grade education.

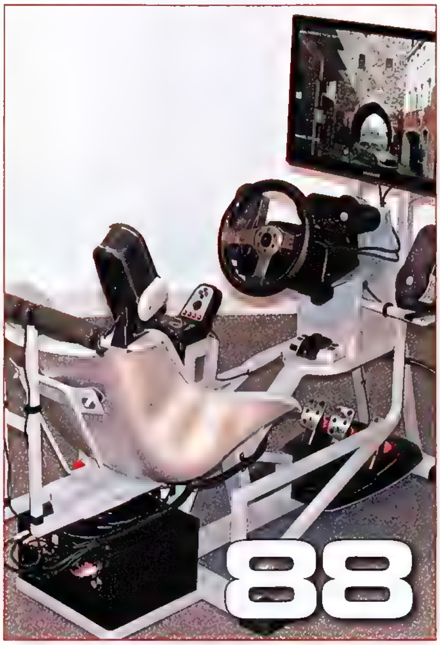
Starting this month is Leigh Dyer's latest treatise on the other other white meat of the OS world, Linux. He's taking all us entrenched Windows users by the hand and walking us through the initial install & setup of Ubuntu, making a huge effort to use only short words and terms that even we can understand.

Bless.

Then it's time for Ron Prouse to put the final – and totally awesome – touches on his driving simulator and take her for a spin around the virtual block. Ron's built some great stuff for us, but we think this is something special – we're sure you'll agree when you see the final product of his labours.

Plus we've got all the usual end of issue goodness to see you closing these pages with a smile on your face. Chris Taylor continues to school us all, Dan Rutter's thinking cap is in overdrive, and then Logan Booker shares some personal details that I'm sure you'll be trying to erase very, very shortly.





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Everything a Windows expert ever wanted to know about installing and setting up Ubuntu Linux, in the first of a series by Leigh Dyer.

Racing Simulator Pt3 88
It's the end of the road, both for Ron Prouse's epic build and all of our driving puns. See how this ambitious project finally ends!

Atomic.edu 93
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IO 96
Dan Rutter answers questions on everything from battery driven solutions to power outages and how processors weave their magic.

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Ever wanted to know Logan's fave porn?

WIN PHAT BEATS!

We've got three copies of DJ Tr!p's fabulous Sid Vicious EP to give away. If you want some retro gaming sounds to liven up your next party, you've got to enter. How? Well...

www.atomicmpc.com.au/competitions

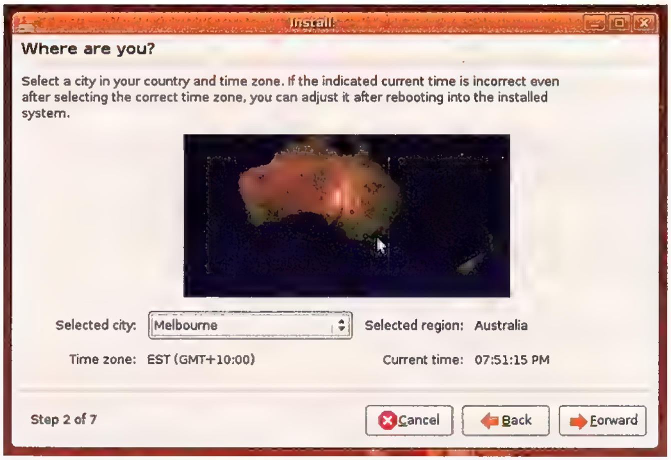
DIFFICULTY **BEGINNER**

Linux for Windows users

Leigh Dyer takes a look at the Penguin through a Windows-tinted pair of glasses.

Just about everywhere you look these days, especially in the wake of Vista's craptacular launch, you see people plugging Linux as the superior alternative, but if you've tried it yourself, you may have been disappointed. Like any OS, Linux isn't perfect, but it is powerful and flexible, and it really can free you from malware hell. The problem is that underneath the Windows-ish GUI, Linux is such a fundamentally different beast that it requires a different way of thinking.

That's why we're here – to show you how to think Linux, based on what you already know about Windows. We'll start by installing it, of course, but in the coming months you'll also learn how to manage your new Linux system, getting it to do the things you need it to do, and showing you how to get out of trouble when things go wrong.



Where are you?

Select a city in your country and time zone. If the indicated current time is incorrect even after selecting the correct time zone, you can adjust it after rebooting into the installed system.

Selected city: Melbourne

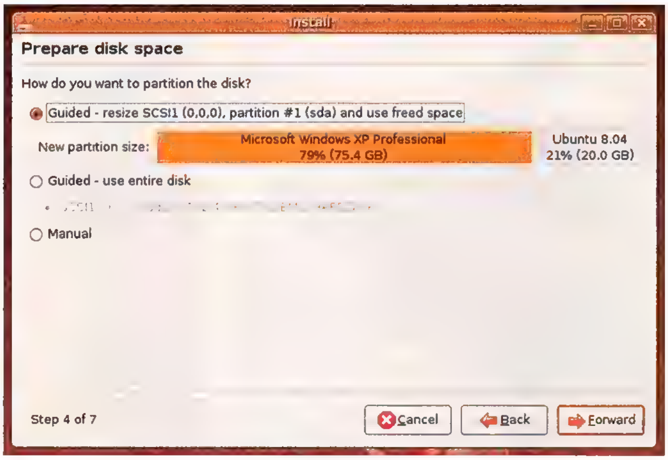
Selected region: Australia

Time zone: EST (GMT+10:00)

Current time: 07:51:15 PM

Step 2 of 7

Installation starts with your language, keyboard type, and timezone.



Prepare disk space

How do you want to partition the disk?

● Guided - resize SCSI1 (0,0,0), partition #1 (sda) and use freed space

New partition size: Microsoft Windows XP Professional 79% (75.4 GB) | Ubuntu 8.04 21% (20.0 GB)

○ Guided - use entire disk

○ Manual

Step 4 of 7

Ubuntu can shrink your Windows drive to make room for itself.

Installing Ubuntu 8.04

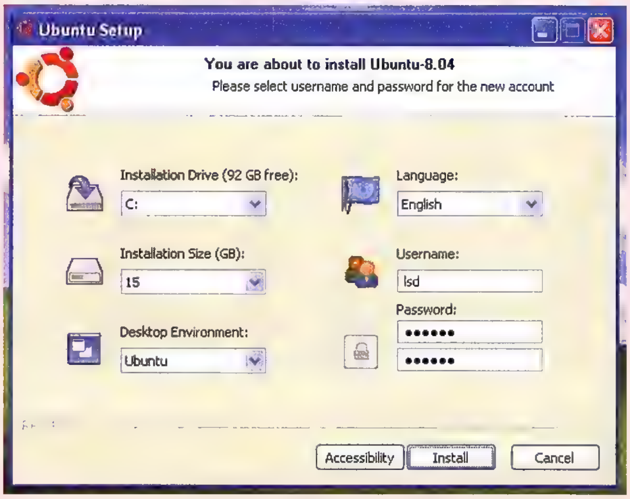
Linux comes in dozens of flavours, each with their own pros and cons, but we had to focus on just one, so we've selected Ubuntu 8.04, aka Hardy Heron, as the Linux distribution (or 'distro') to cover. Ubuntu's a great starting point because it's easy to install and quite compact, distilling the best Linux has to offer down to a single CD.

The first step is to visit **www.ubuntu.com** and grab a copy. On the download page, select the 'Desktop' edition, in either 32-bit or 64-bit depending on what you want to run (I'd stick with 32-bit unless you have 4GB of RAM or more), and then select the mirror you want to download it from. Burn the Ubuntu ISO image to disc, boot from it, and select the 'Try Ubuntu without any change to your computer' option. After a few minutes, you'll be

THE SHORTCUT INSTALLER: WUBI

If you're not sure that Linux is for you, and you don't want to partition your hard drive to find out, then Wubi is the solution. It's an alternative installer for Ubuntu that runs under Windows, eliminates the need to partition your drive, and makes uninstalling Linux as easy as uninstalling a Windows app should you change your mind.

Wubi works by creating a large file on your Windows drive to use as a virtual hard drive for your Linux installation, in much the same way that you'd use Daemon Tools to mount an ISO image as a virtual CD drive. Only the drive is virtual, though, so it's not like running Linux inside VMware or Virtual PC – Linux runs natively, with its own entry in the Windows boot loader, so it's just like a standard dual-boot system.



Ubuntu Setup

You are about to install Ubuntu-8.04

Please select username and password for the new account

Installation Drive (92 GB free): C:

Language: English

Installation Size (GB): 15

Username: lsd

Desktop Environment: Ubuntu

Password: ••••••

••••••

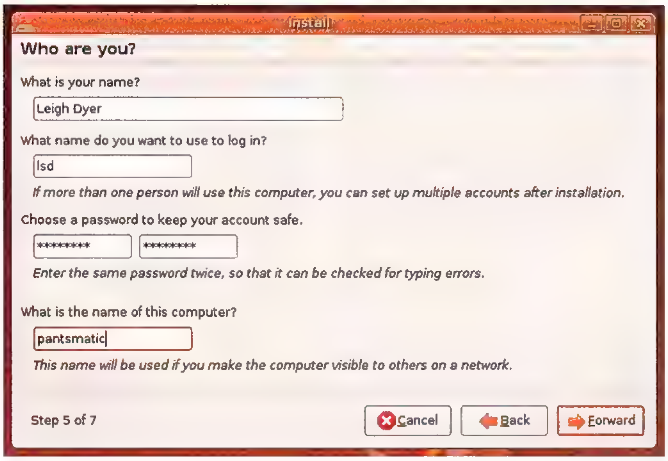
▲ These are the only options you need to fill in to install using Wubi.

There are two ways to install using Wubi – either insert an Ubuntu CD while running Windows and select the 'Install inside Windows' option, or download just the installer from **wubi-installer.org**. Select the amount of space to use, enter a username and password for your account, and hit Install. From there, just enjoy the ride as Wubi configures your virtual drive and installs the system.

sitting at an Ubuntu desktop, running entirely from the CD.

Double-click on the Install icon on the desktop to start the installation. It begins with a few questions about your language, timezone, and keyboard, and then gets to the potentially tricky part: partitioning. The 'Guided' options are generally trouble-free, though – if you have some unallocated space on a new or existing drive, you can use that, or you can use the 'resize' option to shrink your Windows partition to make room. The 'Manual' option gives you total control, but I'd avoid it unless you know what you're doing.

After partitioning, you'll need to enter the details for your initial user account; you also have the option to migrate user accounts from your existing Windows system. After that, click the 'Install' button to set the installation in motion. Within about 10-20 minutes, you'll be able to boot in to your new Linux system.



Install

Who are you?

What is your name?

Leigh Dyer

What name do you want to use to log in?

lsd

If more than one person will use this computer, you can set up multiple accounts after installation.

Choose a password to keep your account safe.

******** ********

Enter the same password twice, so that it can be checked for typing errors.

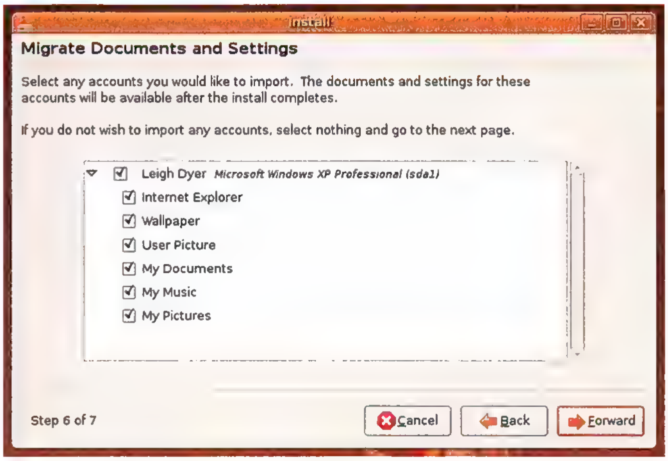
What is the name of this computer?

pantsmatic

This name will be used if you make the computer visible to others on a network.

Step 5 of 7

▲ Create a new user account.



Install

Migrate Documents and Settings

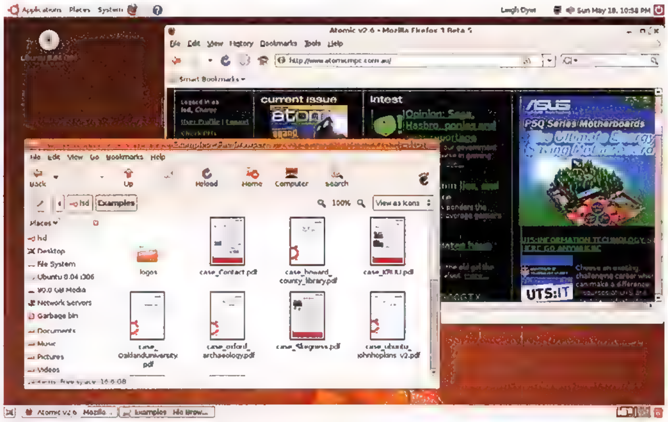
Select any accounts you would like to import. The documents and settings for these accounts will be available after the install completes.

If you do not wish to import any accounts, select nothing and go to the next page.

- ☑ Leigh Dyer *Microsoft Windows XP Professional (sda1)*
  - ☑ Internet Explorer
  - ☑ Wallpaper
  - ☑ User Picture
  - ☑ My Documents
  - ☑ My Music
  - ☑ My Pictures

Step 6 of 7

▲ Migrate existing accounts from Windows.



▲ Ubuntu up-and-running after installation.

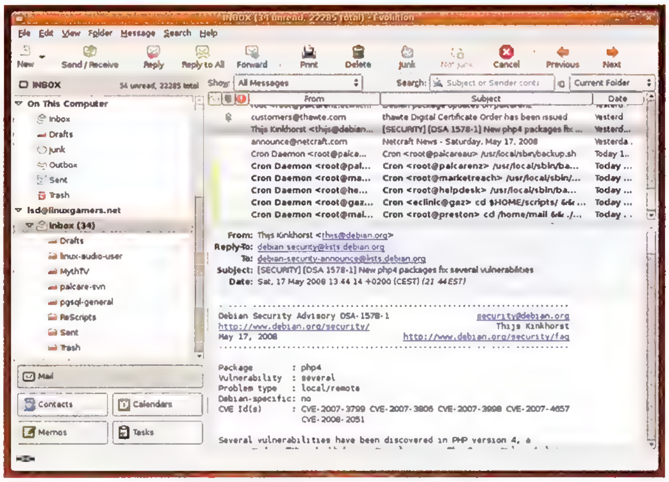
The desktop: a quick tour

The GNOME desktop used in Ubuntu isn't radically different to the Windows desktop, though there are a lot of little differences, like the panels on top and bottom that replace the Windows taskbar. The desktop menus at the top left replace the start menu, the 'notification area' near the clock in the top right corner is much like the system tray, and most of the bottom panel is used for switching between windows. The top panel also has a few application launchers (think shortcuts).

The panels are completely configurable, so you can add items to them by right-clicking on a panel and selecting 'Add to Panel' – try adding a System Monitor to track your CPU usage, for instance. You can even add and remove entire panels.

In the 'Applications' menu you'll find at least one familiar face: Firefox is Ubuntu's default browser, and it's essentially identical to the Windows version. The same goes for OpenOffice.org, the open-source office suite. Other key applications include Evolution, an Outlook-style email and PIM tool, and Pidgin, an instant messenger that supports Jabber, AIM, ICQ, and MSN (or whatever it's called these days), among others.

Rhythmbox is the default music player, with an iTunes-style interface and support for transferring files to most portable players. It doesn't actually support MP3 out of the box due to patent issues, but it'll automatically install



From	Subject	Date
customers@thawte.com	thawte Digital Certificate Order has been issued	Yesterd
Thijs Kinkhorst <thijs@debian...	[SECURITY] [DSA 1578-1] New php4 packages fix ...	Yesterd...
announce@netcraft.com	Netcraft News - Saturday, May 17, 2008	Yesterda..
Cron Daemon <root@palca...	Cron <root@palcareau> /usr/local/sbin/backup.sh	Today 1..
Cron Daemon <root@pal...	Cron <root@palcarenz> /usr/local/sbin/ba...	Today ...
Cron Daemon <root@ma...	Cron <root@marketreach> /usr/local/sbin/...	Today ...
Cron Daemon <root@he...	Cron <root@helpdesk> /usr/local/sbin/ba...	Today ...
Cron Daemon <root@gaz...	Cron <eclinic@gaz> cd $HOME/scripts/ && ...	Today ...
Cron Daemon <root@mai...	Cron <root@preston> cd /home/mail && ./...	Today ..

From: Thijs Kinkhorst <thijs@debian.org>
Reply-To: debian-security@lists.debian.org
To: debian-security-announce@lists.debian.org
Subject: [SECURITY] [DSA 1578-1] New php4 packages fix several vulnerabilities
Date: Sat, 17 May 2008 13:44:14 +0200 (CEST) *(21:44 EST)*

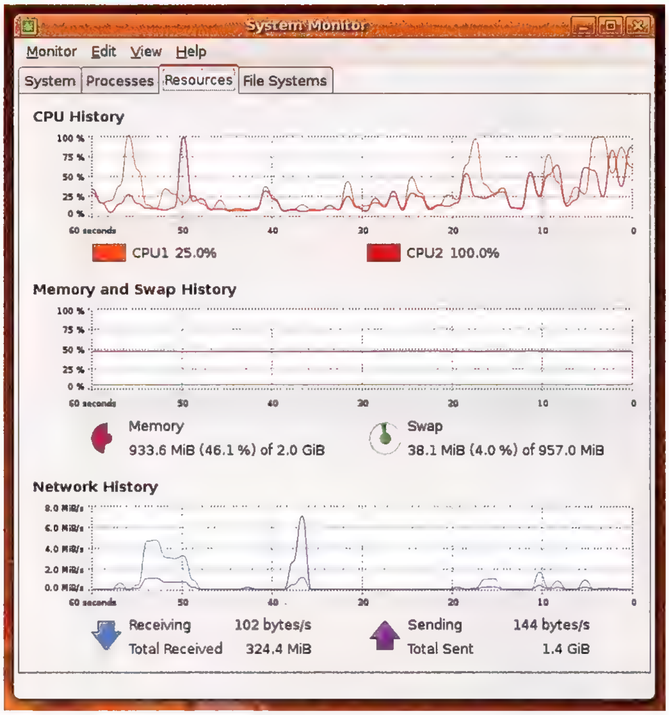
```
------------------------------------------------------------------------
Debian Security Advisory DSA-1578-1                  security@debian.org
http://www.debian.org/security/                           Thijs Kinkhorst
May 17, 2008                          http://www.debian.org/security/faq
------------------------------------------------------------------------

Package        : php4
Vulnerability  : several
Problem type   : local/remote
Debian-specific: no
CVE Id(s)      : CVE-2007-3799 CVE-2007-3806 CVE-2007-3998 CVE-2007-4657
                 CVE-2008-2051

Several vulnerabilities have been discovered in PHP version 4, a
```

Evolution takes care of mail duties.

an MP3 codec the first time you try to play an MP3 file. The same goes for Totem, the default video player.

To access the file system, select a folder from the Places desktop menu. The 'Home Folder' is where all of your documents and settings are stored, including the other listed folders (like Documents and Music). You can also open any attached drives, including your Windows drive (Linux has full support for both FAT32 and NTFS), and browse your network for Windows shares.

Under the System menu you'll find the 'Preferences' folder, which contains dialogs to alter your personal settings (like your screensaver or mouse preferences), and the 'Administration' folder, which contains tools for configuring your system, such as printers and network settings. The 'Administration' folder also contains a few useful utilities: Network Tools lets you ping and traceroute, System Monitor shows your resource usage and running tasks (much like the Windows Task Manager), and System Log is the equivalent of Event Viewer.



CPU1 25.0%
CPU2 100.0%

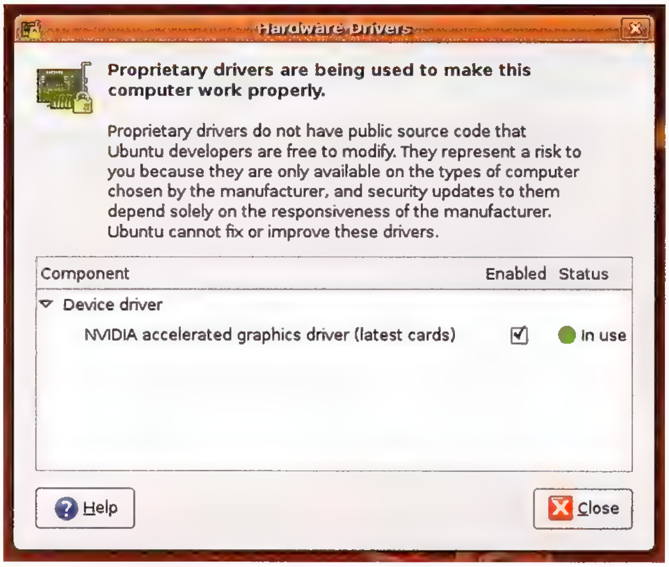
Memory 933.6 MiB (46.1 %) of 2.0 GiB
Swap 38.1 MiB (4.0 %) of 957.0 MiB

Receiving	102 bytes/s	Sending	144 bytes/s
Total Received	324.4 MiB	Total Sent	1.4 GiB

System Monitor replaces the Windows Task Manager.

Hardware drivers

One nice thing about Linux is that most supported hardware works out-of-the-box, since open-source hardware drivers from vendors and the community are often quickly rolled in to new Linux releases. Unless your hardware is very new, you shouldn't run in to any problems with SATA controllers, Ethernet devices, and sound cards. Some devices though – mainly wireless LAN devices and video cards – won't work well, or at all, without closed-source drivers provided by the vendors.



Proprietary drivers are being used to make this computer work properly.

Proprietary drivers do not have public source code that Ubuntu developers are free to modify. They represent a risk to you because they are only available on the types of computer chosen by the manufacturer, and security updates to them depend solely on the responsiveness of the manufacturer. Ubuntu cannot fix or improve these drivers.

Component	Enabled	Status
Device driver		
NVIDIA accelerated graphics driver (latest cards)	☑	● In use

Install proprietary drivers, like NVIDIA's hardware-accelerated drivers.

UBUNTU? KUBUNTU? XUBUNTU? WTFBUNTU?

When you were downloading Ubuntu, you may have noticed some of its other variants, like Kubuntu and Xubuntu. These versions of Ubuntu replace the standard GNOME desktop with alternatives, like KDE or XFCE. These desktops are similar to replacement Windows shells, like LiteStep, but they reach far deeper into the OS than that.

This is possible because of Linux's modular design. The Linux kernel itself is only the lowest layer of a Linux system, handling hardware devices, memory management, and task scheduling. On top of this is a set of core libraries and command-line tools that turn Linux in to a functional text-based OS.

The GUI on top of this also consists of a number of components. At the lowest level is the X.Org server, which handles the video hardware and sets up the basic display. On top of this are GUI libraries, which range from simple drawing libraries to rich GUI toolkits, and on top of these are the actual desktop components, from the window manager, which draws window borders and handles their behaviour, through to the file manager, panels, and application launch menus.

The beauty of this is that these components can be swapped and replaced. GNOME, XFCE, and KDE all do basically the same thing, but they're implemented in their own ways. Applications are all interoperable, though, so you can run GNOME apps on a KDE desktop and vice-versa. These aren't the only options, either – there are literally dozens of other desktops, ranging from stand-alone window managers to complete desktops, and everything in between. Everyone has their own idea of what makes a great desktop, which is why so many options exist in the first place, so it's definitely worth looking at the options.

The other advantage of this modular approach is that just about everything is optional – on a headless server, for instance, you can do away with the GUI entirely. Embedded systems, like the Linksys WRT54G router, take this to extremes by squeezing Linux into 4MB or less.

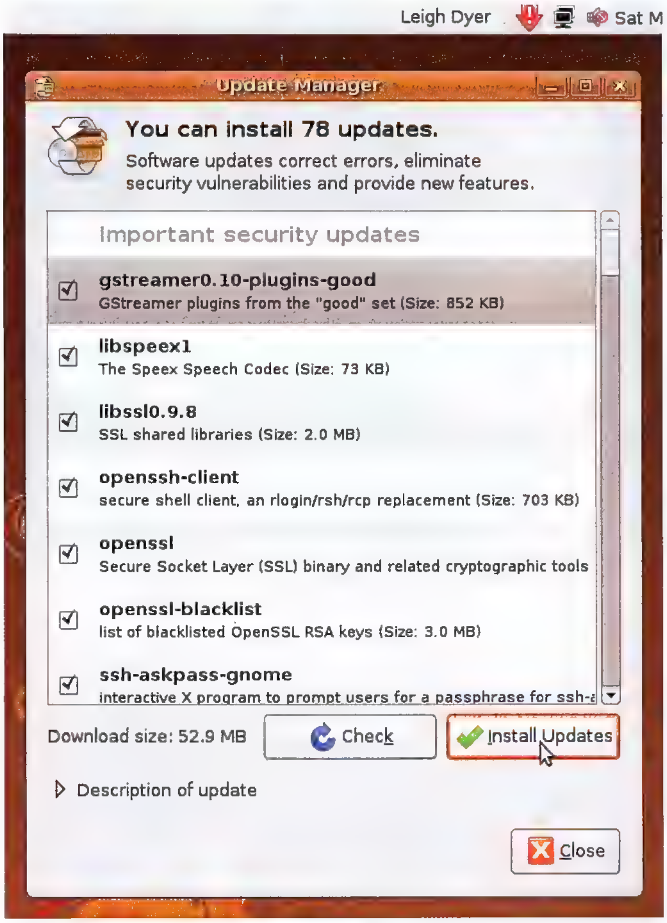
Ubuntu doesn't include these drivers on the CD, but it can download them automatically for you. If you have hardware that needs a proprietary driver, like an NVIDIA or ATI video card, you should see a hardware icon in the notification area. Click on this, or select 'Hardware Drivers' from the System/ Administration desktop menu, to open the proprietary driver manager, where you can download and install drivers by ticking the checkboxes next to them.

> "One nice thing about Linux is that most supported hardware works out-of-the-box..."

Software updates

Installing software updates under Ubuntu is a very easy process. By default, Ubuntu checks its servers for updates once a day, and if any are available, a red arrow will appear in your top panel. Clicking this opens the Update Manager, which lists the available updates and lets you browse through the changelogs. To install them, just click the 'Install Updates' button – the updated software will be downloaded and installed automatically.

Ubuntu handles updates through its package management system, which downloads software automatically from the web. We'll discuss this more next month, but for now, you might want to set the download server to your ISP's free-traffic Ubuntu mirror. Select 'Software Sources' from the 'System/ Administration' desktop menu, and click on the 'Download from:' drop-down.



You can install 78 updates.

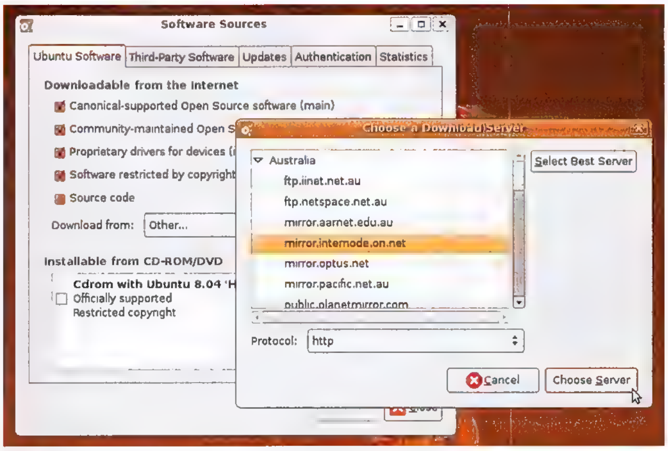
Software updates correct errors, eliminate security vulnerabilities and provide new features.

Important security updates

- ☑ **gstreamer0.10-plugins-good** GStreamer plugins from the "good" set (Size: 852 KB)
- ☑ **libspeex1** The Speex Speech Codec (Size: 73 KB)
- ☑ **libssl0.9.8** SSL shared libraries (Size: 2.0 MB)
- ☑ **openssh-client** secure shell client, an rlogin/rsh/rcp replacement (Size: 703 KB)
- ☑ **openssl** Secure Socket Layer (SSL) binary and related cryptographic tools
- ☑ **openssl-blacklist** list of blacklisted OpenSSL RSA keys (Size: 3.0 MB)
- ☑ **ssh-askpass-gnome** interactive X program to prompt users for a passphrase for ssh-a

Download size: 52.9 MB

Update Manager takes care of software updates.



Downloadable from the Internet

- ☑ Canonical-supported Open Source software (main)
- ☑ Community-maintained Open S
- ☑ Proprietary drivers for devices (
- ☑ Software restricted by copyright
- ☐ Source code

Download from: Other...

Installable from CD-ROM/DVD

- ☐ Cdrom with Ubuntu 8.04 'H Officially supported Restricted copyright

Australia
- ftp.iinet.net.au
- ftp.netspace.net.au
- mirror.aarnet.edu.au
- mirror.internode.on.net
- mirror.optus.net
- mirror.pacific.net.au
- public.planetmirror.com

Protocol: http

Use the right mirror for your ISP to save on bandwidth charges.

It'll currently be set to the official Australian server, but if you select 'Other', you can choose an alternative mirror.

User management

You'll create at least one user account during installation, or perhaps more if you migrated accounts from your Windows system. To create more user accounts, use the 'Users and Groups' tool in the System/Administration desktop menu. Click the 'unlock' button and supply your password, and you can then create, edit, and delete user accounts.

You can also manage your user groups, which are much like the Windows equivalents. Each user account is associated with one main group, but you can add users to any number of additional groups as well. Groups are used primarily to manage file permissions, which we'll discuss more later on.

Next month

In the next part in our series, we'll be looking at installing and removing software using Ubuntu's package management features, the structure of the Linux filesystem, and coming to grips with the Linux shell.

DIFFICULTY **ADVANCED**

Car Simulator Tutorial Pt 03

It's time for the final time trails and practice lap to end. The race is about to begin…

As we mentioned at the end of Part 02 of this tutorial, we needed to get the chassis ready for finishing; in this instance, powder coating. The first step was to remove all of the welding splatter and existing surface coatings. So that the top coat had a solid, clean surface to adhere to, it was dragged off to the sandblasting shop. According to Wikipedia, sandblasting or bead blasting is (paraphrased) "a generic term for the process of smoothing, shaping and cleaning a hard surface by forcing solid particles across that surface at high speeds; the effect is similar to that of using sandpaper, but provides a more even finish with no problems at corners or crannies. An artificial sandblasting process was patented by Benjamin Chew Tilghman on October 18, 1870.

An average sand blasting handpiece.

Historically, the material used for artificial sandblasting was sand that had been sieved to a uniform size, however other materials can be used instead of sand; for example, steel or copper grit, steel shots, slag, glass beads (bead blasting), dry ice, garnet, powdered slag, ground coconut/walnut shells or corncobs, and even baking soda can be used for specific applications and can produce distinct surface finishes".

Our simulator was thoroughly blasted with garnet sand, using a gun similar to the one pictured. Compressed air is forced through the hand-piece, passing over a venturi that causes garnet abrasive to be drawn up through the front tube and forced out at high pressure through the ceramic nozzle. The chassis came back as clean as a whistle, and ready for the next step, powder coating.

Powder coating is mainly used for coating of metals such as white goods and automobile and motorcycle parts; in fact, any application that requires a hard surface finish that is tougher than conventional paint. The main difference

SUPPLIES

PC CASE GEAR
http://www.pccasegear.com, Ph 03 9584 7266

- Logitech® G25 Racing Wheel, $349.00
- Logitech® G51 Speaker System 5.1 channel sound, $216.00
- Buttkicker Gamer, $274.00

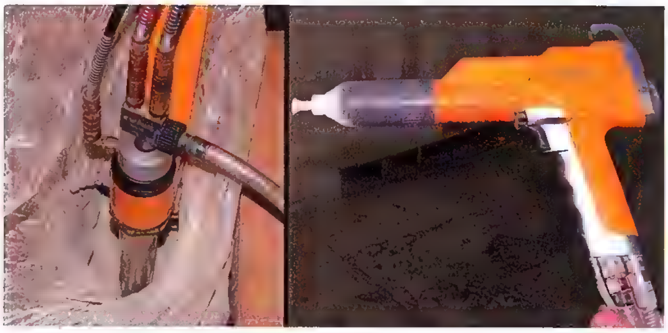
SAMSUNG AUSTRALIA
http://www.samsung.com/au/

- 2493HM LCD 1920x1200(WUXGA)Monitor, approx. $700

We also used a heap of steel stock and sheet in various sizes, and a Repco Ergometer exercise bike! Sandblasting something this big will cost approximately $100, and powder coating about $250 – depending on the colour of the finish.

TOOLS

Some of the tools used in this tutorial might not be found in the average workshop, such as the MIG welder, but most of the work is performed with more mundane items such as a 100mm grinder, drill press and drills, linishing machine/disc sander, and ½ sheet electric sander. The main requirement is a decent bench or table, providing a solid, flat surface to operate on. Or the floor.



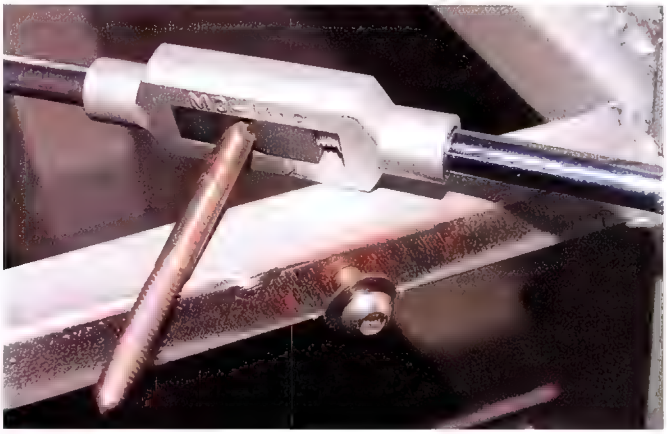
Powder coating applies a dry coating of colour using a special spray gun and static attraction.

in application between a conventional liquid paint and powder coating is that the latter does not use a solvent to keep the binder and filler components in a liquid suspension form. As visible at the left of the picture, the coating is initially a free-flowing dry powder, which is applied electro-statically and then melted in an oven which allows it to flow and form an even 'skin'.

> “Powder coating is mainly used for coating of metals such as white goods parts...”

The most common way of applying powder coating to metal objects is to spray the powder using an electrostatic, or Corona, gun. The gun imparts a positive electric charge on the powder, which is then sprayed via compressed air towards the object, which is grounded – the powder then 'sticks' to the part being coated as a thin, even coating. As mentioned, the object is placed into an oven, heated so that the powder melts into a uniform film, and then cooled so that the paint solidifies into a hard coating.

The colour chosen for the chassis was 'silver pearl', a semi-metallic finish that we decided would look great against all of the black components.



Adding some class with stainless steel fittings.

DISCLAIMER

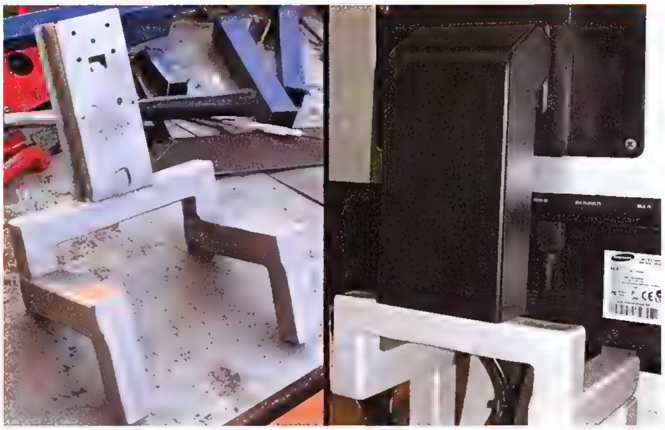
Whenever you pick up power tools, cutting and grinding instruments, or even a can of spray paint, you are putting your general wellbeing at risk from some form of industrial level accident. We take every precaution by wearing appropriate safety equipment, using tools with respect and within their limits, and by not inhaling the contents of glue and paint containers. We suggest that you should follow a similar regime, and seek professional assistance and guidance if you are attempting a task outside of your skill set.
NB. Atomic and staff are not responsible if you hurt yourself

Assembly of our simulator could now begin in earnest. To give the project durability and a higher build-quality, all of the cover plates and chassis modules were drilled, tapped, and screwed together using 6mm stainless steel fittings wherever possible. Using 'screw in' solutions takes extra time and effort, but over the long term that additional labour repays itself many-fold. Another good habit is to use the same fittings wherever possible, not only from an aesthetically 'consistent' perspective, but it also means that you will need fewer tools to fabricate and disassemble the parts.

The pedal-box (image upper) and gear lever modules (image lower) were mounted to their respective steel plates, using the 6mm threaded holes in their bases. In both cases, templates were made by tracing the positions of the mounting holes onto sheets of paper, and then transferring the measurements over to the chassis. The plates were drilled using a 7mm bit to allow for a bit of variation and movement to suit. All of the holes were countersunk and the bare metal surfaces touched-up with clear acrylic paint. Attached in this manner, both components were now secured as 'solid as a rock', and the plastic clamps from the gear lever module could be removed as they were totally superfluous.

This photo is enough to break a Geek's heart and stomp on the pieces.

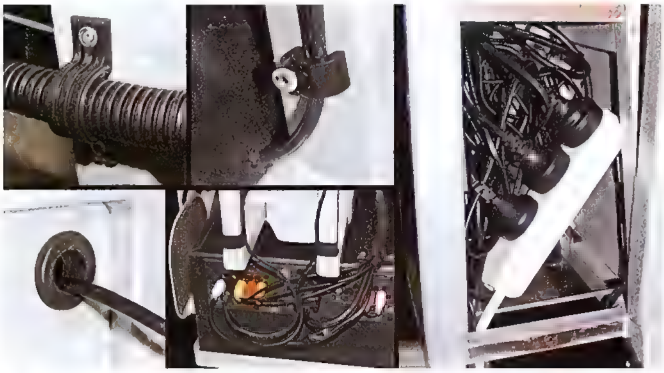
The next step was to mount the monitor, a Samsung 2493HM, 24in wide TFT-LCD computer screen featuring 1920 x 1200(WUXGA) resolution, 10000:1 contrast ratio, 5ms response time and HDMI interface. You can adjust the tilt angle within a range of 5° forward to 25° backward for the most comfortable viewing angle. As soon as the monitor arrived it was unpacked and connected to our PC – just to make sure that it worked, of course. This is not a qualified review, however our initial response was "Wow! Now that is real 1080HD". The display was sharp and bright, with brilliant colour saturation and crisp easy-to-view images. The stand itself is an engineering marvel, with excellent height, tilt and swivel adjustment, combined with a sexy high-gloss black and chrome



We used as much of the OEM screen bracketry as we could.

bezel that made the monitor a thing of beauty… so we pulled it to pieces, cut it up and painted it! Chopping and modifying the 2493HM was one of the most remorseful things that I have had to do for a long time, but at least we recycled the leftovers responsibly.

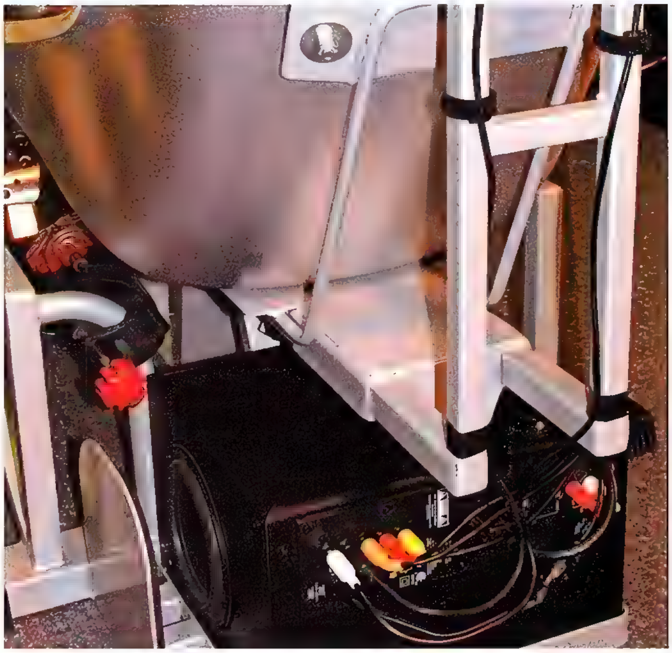
Once all of the external covers, base and Magic Lift mechanism had been removed, we retrieved the main monitor bracket, top hinge and retention plate. After fabricating up a lower support section out of 25 x 25mm stock horizontals and 30 x 30mm uprights, and shaping it with a mop wheel, the original bracket was boxed-in and MIG welded to the new support. Being small, we could sandblast this part ourselves, and give it a coat of gloss black enamel… and then decide to sandblast it again and take it to the powder coaters. We wanted to maintain the upper sections of the OEM bracket and plastic shroud for one main reason – to retain the 5° forward to 25° backward tilt angle adjustment and 180° swivel. Combined with the monitor's 160°/160° viewing angles, this will ensure the best possible adjustment for perfect screen orientation. The OEM shroud was modified to fit to length, and adds 'polish' to the finished product.



We pulled out a lot of old tricks to keep the wiring loom as inconspicuous as possible.

The wiring was always going to be a little messy, as the two main electrical components are at opposite ends of the chassis! The decision was made to have the power and data 'entry point' at the front of the unit, and run the AV sound input and G51 controller cable back to the subwoofer. Eventually, most of the sound makes its way back up to the front and centre speakers… the rest goes to the rear effects speakers. The vision component is via the PS3HDMI output, and passes up through the chassis, and up to the monitor.

As mentioned in the Pt 02 tutorial, the section of chassis in front of the steering wheel was enclosed so that it could be used to assemble, conceal and route the controller wiring and power cables. The gear change and pedal-box wiring runs up through the lower right-hand section of the enclosure, which has a clear, 4mm thick Perspex 'floor' held in place with Velcro. From there, the controller wires run up through the steering wheel plate into the wheel connectors – conversely, the USB input cable and power wire run down into the enclosure, where the power brick is connected to a three-plug power board that also services the speakers and the LCD screen. The front speaker wires run out through each side of the enclosure, with 19mm rubber grommets fitted to protect the cables where they pass through the sheet metal. The final wiring to pass into the enclosure is the thick cable for the surround sound controller, which is then routed back to the sub-woofer box.



The finishing touches to the wiring loom and seat

To keep the main wiring to the rear section neatly out of the way, 13mm black loom tube (available from any automotive shop) was used to hold all of the cables together, and attached to the chassis with black PVC saddles (which you can from the irrigation section at Bunnings) secured by 1/8in aluminium rivets. The wiring from the gear change and pedal-box assemblies was held in place using 3mm black PVC cable clips every 15cm, the loops of which were ground-down on a belt sander until the cables were a neat fit. The clips were then drilled and also secured to the chassis with 1/8in aluminium rivets.

Finally, the data wires that attach to the PS3 and the 240V power cord were routed out through the lower left-hand section of the enclosure, wrapped in 20mm Dune tube (Jaycar Cat# HP-1237).

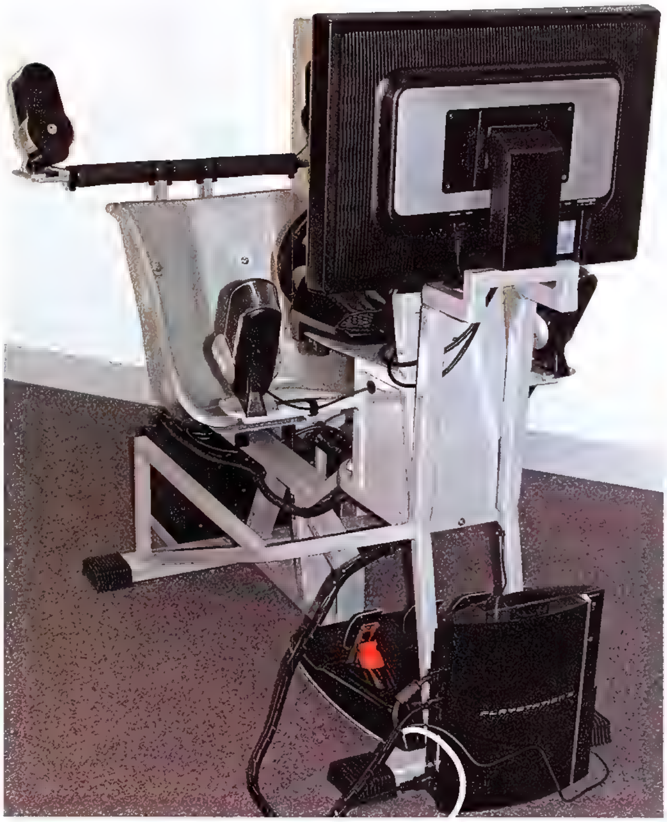
The G51 surround sound controller was attached to the chassis using a double-sided epoxy tape, and feels like it will be there for all of eternity.

The cables to the rear speakers were about a metre too long, and had to be shortened. Replacement RCA plugs in black and white were sourced (Jaycar Cat# PP0242 & PP0244) and soldered onto the cables after they were cut to the required length.

▲ **If only we could get the Buttkicker to work effectively in this environment.**

The clear fibreglass go-kart seat had looked good during the initial build, however once the chassis had been powder coated silver it looked yellow(ish) and unfinished. Easily fixed. The outside surface was given two coats of paint, using Solver Brite-Glow Silver enamel, so that it better matched the rest of the chassis – the interesting side benefit was that it made the inside surface of the seat look somewhat like grey carbon-fibre.

The final component to be fitted was the Buttkicker Gamer, mounted to the purpose-made bracket under the left-hand side of the seat. This was the moment of truth, as we hadn't really believed that this would work from the beginning – as we mentioned previously, the simulator chassis is much heavier and more rigid than the average office chair, so it was a big ask for the Buttkicker to perform as it normally would. Unfortunately, we were right; all the unit could do was initiate some very annoying vibration in the gear shift module. Actually this outcome was a shame, as we wanted to include as many 'realistic' elements into the simulator as possible, and the Buttkicker does such a great job in its intended environment. We left it attached for the photos.



▲ **The addition of some silver paint to the rear of the screen helped to pull the look together.**

▲ **The view from the drivers seat – if you are slouched down.**

The intention was to have a Playstation3 MadCatz Game Stand fitted to the front of the simulator, so that the console was attached in a secure upright position, making the simulator a fully self-contained gaming machine. Unfortunately, they are on back-order at the moment! If there had been one available, we were going to cut off the rear section that stores games/covers, and screw the remainder down to a 3mm thick, aluminium 'L'-plate attached to the front of the chassis, roughly oriented where the PS3 is in this picture. We will still complete this task as soon as the stand arrives. Final pics will be posted on **www.atomicmpc.com.au**.

> “With a degree of apprehension, we fired up the simulator for the first time...”

If you are wondering why there is a large amount of silver on the rear of the Samsung screen which isn't there normally, it's because in its OEM condition there was too much black! Solver Brite-Glow Silver enamel fixed that aesthetic issue with two coats applied over the top of an etch primer.

The view from the drivers seat? Well, its actually from about neck height – the visible Samsung logo is for the sponsor. With a degree of apprehension we fired up the simulator for the first time, letting *Gran Turismo 5 Prologue* go through the process of calibrating the G25 wheel and the intro movie. After adjusting the seat position, getting the surround sound and sub-woofer 'right', and calibrating the amount of force feedback effect, it was time to play the game.

The vision is crystal clear, and the screen is just the right size to dominate

even our inner-peripheral sight. The speakers add the next level of immersion, with sound and effects seemingly coming from every direction, while the sub-woofer placement adds just the right amount of physical feedback into the seat of your pants.

The standout feature, though, is the G25 steering wheel package. The force feedback effect is brilliant, the pedals feel realistic with their different levels of spring tension, and the gear lever is… well, the gear lever is pretty crap, but we can live with it! Overall, using the simulator takes the driving experience to a new level, adding additional elements and enjoyment to the game. The only thing that we have had to do is print out a sticker for the dashboard of the car, "Remember… THIS IS RL!"

Just some eye candy …

Common course

Wondering where to start your studies? **Chris Taylor** has a few good ideas.

For those of you in your final year of secondary education, the time for selecting a university course – assuming that's part of your plan, obviously – is fast approaching. And so, this month we're looking at the most popular technical courses. These are courses available at many universities throughout Australia. While the units (individual subjects and electives), majors and minors on offer may vary considerably from institute to institute, the core of the course shouldn't. The information presented here should hold true whether you're looking at Monash University or the University of New South Wales.

Computer Science

Just as the name of the course implies, computer science is a veritable feast of heavy theory on the development and use of computer hardware and software. You'll want to do computer science if you're at all interested in getting into cutting edge fields like robotics, bioinformatics and artificial intelligence. Some universities, including RMIT University in Melbourne, even offer games development majors. A computer science degree is a very versatile course and no matter what institute you're with, you'll find a plethora of interesting units available covering such topics as cryptography, graphics, human-computer interaction and computational neuroscience (the science of using computers to model the human brain). Depending on the institute, you might be roped into doing some sort of 'communications'-focused unit – an issue we've discussed at length over the last few months.

> “Depending on the institute, you might be roped into doing some sort of 'communications'...”

As a student of computer science, you'll be doing a lot of programming in a lot of different languages. And you will, no matter your chosen path, gain a solid understanding of exactly what makes computers tick. If you think computer science is for you, a word of advice – figure out exactly what you want from it and select electives accordingly. There are just so many specialist units available with this course that it's easy to walk out of university three or four years after you started with a qualification that's not focused on anything in particular because you let yourself get taken in by a lot of different fascinating units without first thinking about where they'd take you once you finished your studies.

In terms of entry requirements, computer science, like pretty much every other degree out there, will want you to have the equivalent of a 50 per cent mark – a pass, in other words – in at least one of your state's year twelve English units (in Victoria, at least, that means you'd need a study score of 25 in English, ESL and/or Literature). And you can bet your arse you'll need an intermediate

or advanced maths unit to your name. Rare is it to see universities actually require you to study information technology in year twelve.

Information Systems

Most information technology courses out there will include a unit or two on information systems as core, but it's possible at some universities to become a specialist in this field. Essentially, information systems is the study of how data, information and users interact with each other in a given environment – say, for instance, an insurance company. Information systems courses can best be described as the bastard offspring of the information technology and business faculties. Over the three years you're at university, you'll frequently be moving between those two buildings to attend lectures and tutorials.

Also, this field, in case you haven't realised, places great emphasis on being able to communicate. An information systems specialist isn't the kind of guy who just locks himself away in an office while he codes non-stop for days, fuelling himself on an unholy cocktail of caffeinated beverages, MSG-flavoured instant noodles and Skittles. That's not to say he's any less of a problem solver, though.

Assuming you're going to be studying full time, an information systems degree should take you three years to knock over. In that time you'll cover project management, systems analysis and design. You'll probably have to do a unit or two on technical writing, too, as pumping out obscene amounts of documentation for all sorts of stuff is definitely part of the information systems specialist's job description. You have been warned.

Entry requirements? Doubtful they'll demand much in the mathematics department. Being able to speak and write English would probably help.

Information Technology

Information technology degrees are very versatile qualifications. All information technology degrees will give you a grounding in the basics of computing – some architecture stuff, maybe a core unit or two on a language like Java or C++, a project management class – but it's after the first year that you're able to specialise in any number of fields. You won't get all the cutting edge, highly specialist stuff like you do a in a computer science course, but depending on the university, you will be able to major in areas such as networking, programming, games development, web technology, security and even multimedia. Whereas a few years ago universities used to have a crap-tonne of different courses on offer – many of which overlapped something awful – now everyone's offering what's known as an information technology degree, which you can tailor to your needs and desires.

Entry requirements vary from university to university, but once again you'll need to pass English. Maths wouldn't hurt, but it probably isn't necessary. The actual entry score – the UAI, ENTER or whatever it is your state calls it – for these courses is nowhere near as high as it is for computer science or software engineering.

> “...once again you'll need to pass English. Maths won't hurt, but it probably isn't necessary.”

Multimedia

At Monash University and other institutes, the multimedia degrees of yesteryear have sort of been gobbled up into the aforementioned information technology course for reasons of efficiency. Nonetheless, standalone multimedia courses are on offer at enough institutes to justify us writing on it by itself.

A multimedia course will open all sorts of doors, including graphic design, education, marketing, publishing, web development and, of course, games development. It all depends on how you choose your electives. As a student of multimedia you'll cover as many units which are essentially arts and communications classes as you will traditional information technology classes on topics such as programming.

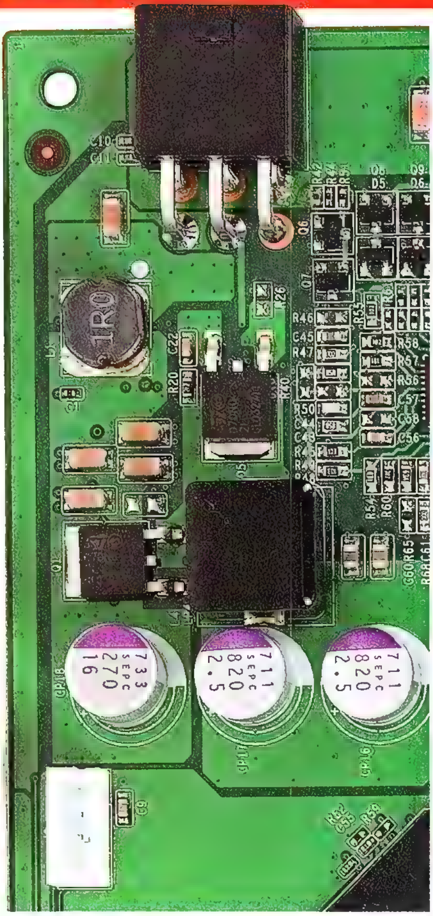
The multimedia courses at a few universities, including Monash University, also offer the opportunity to study games development. And they don't just look at the animation and design aspect. At Monash, students of what's now known as the Bachelor of Information Technology and Systems (Multimedia Games Development) study narrative, artificial intelligence and programming in C++ and Java. Take note that as there is high demand for games development positions and the work itself is a bit more difficult given you're doing a lot more programming, you might find the entry requirements for a multimedia course majoring in games development a little higher than those for a regular multimedia course. Also take note that the entry requirements for multimedia courses often place as much emphasis on your artistic ability as your academic performance. Some universities will ask to see a portfolio of both digital and traditional (ie. something pretty drawn on a sliver of dead tree with one of those bizarre, old-fashioned devices known as a pencil) artworks.

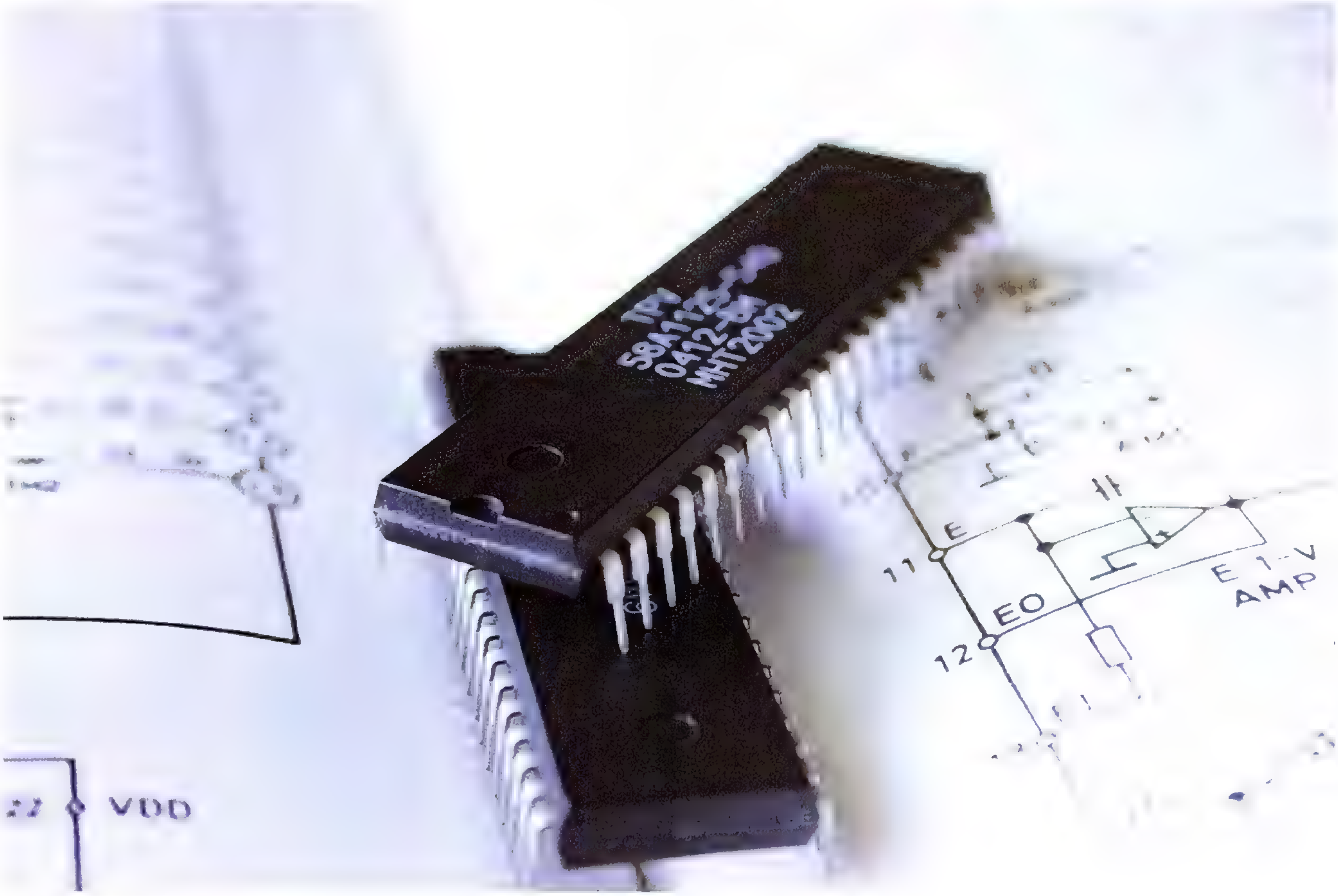
Software Engineering

Put simply, software engineering is a *serious* programming degree. It's about designing and creating very large, very complex programs, as well as leading teams of other programmers – meaning beyond obvious large amount of programming classes you'll be made to do, you'll be spending a lot of time learning how to write technical documents and manage projects. Towards the end of the four year course you'll spend twelve weeks – a semester, essentially – working in the industry, so expect to walk away from a software engineering degree not only with a piece of paper, but actual experience and possibly even a job offer too.

Although they vary from institute to institute, expect the entry requirements for a software engineering degree to be similar to those for computer science – a decent ENTER/UAI/etc score, a pass in English and either an intermediate or advanced maths unit. Having studied information technology in school is rarely, if ever, a requirement.

Speaking of computer science, there is a lot of crossover between the two fields. As a student of software engineering you will frequently find yourself sharing a lecture theatre with computer science students and vice versa. Too, a good many software engineering jobs can be obtained with a computer science degree.





INPUTOUTPUT

Fixing stuff no one else can, including God and your mum

I/O

Daniel Rutter's getting himself all hot under the collar dealing with reader problems.

I/O OF THE MONTH

Music routing

On home audio receivers there is the capability to switch between speaker sets – 'A' or 'B – for speakers, say, in your office and/or on your deck.

I have my monitor on an arm where I can use it at my computer in my office, or extend the arm through the bedroom door and use it as my TV while in bed. I have a Logitech X540 speaker system in my office (A). I want to put another X540 system in my bedroom, switching to it (B) when using in my bedroom.

Is there a reasonable way to make this happen?

Scott Darnell

There's no cheap and elegant way to do this, but it can be done, probably for only about twenty bucks plus cables. Just switch the analogue audio, all 5.1 channels of it.

$10 A/V switchboxes are all over eBay and the discount stores – they're often called something like 'Video Game Selector Switch' or some such, because they're meant to let you connect two or three analogue audio/video sources to the single set of connectors on a TV.

The simplest ones just have sets of three RCA sockets for hookups - two for audio, one for composite video. Fancier models (we're still talking only ten bucks per) have S-Video sockets, too.

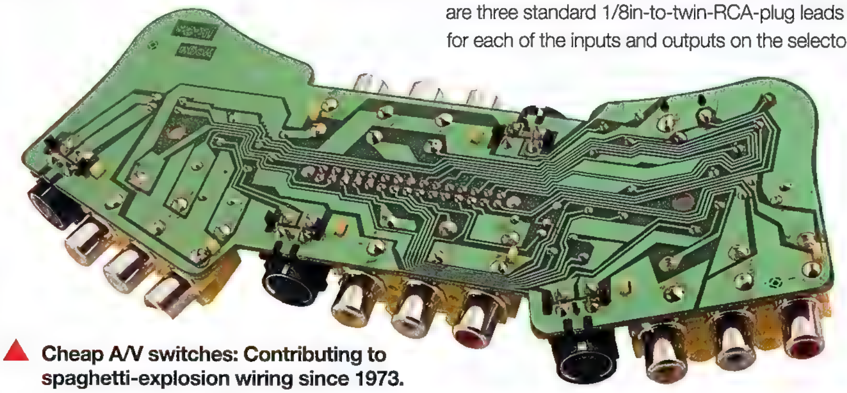
These selectors are very simple inside, with no impedance matching transformers or anything; just a sliding switch with two or three throws and a buttload of poles, connecting one set of inputs at a time to the single output.

Because of this simplicity, you can easily use such a selector backwards, to send one source to one of two or three destinations depending on the switch setting. There's your audio destination selector, right there.

There are some resistors in the selector I've got here which suggest to me that trying to hack audio through the S-Video connectors isn't a good idea, though. So that leaves you with three channels to play with, because using the composite video connectors for audio should be A-Okay.

If all you want to switch is stereo audio, possibly plus a single subwoofer channel, a single one of these switches should do just fine. If you want 5.1 channels, just buy two switches, and distribute your audio wires between them. Now you have to flick two cheesy plastic switches to get all of your audio going to the second destination, but that's no big deal.

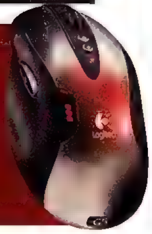
For cabling, unless you got a selector switch with 1/8th inch stereo plug inputs and outputs, you'd need adapters to turn those computer-standard connectors into RCAs and then back into 1/8in plugs. All you ought to need, though, are three standard 1/8in-to-twin-RCA-plug leads for each of the inputs and outputs on the selector.



▲ **Cheap A/V switches: Contributing to spaghetti-explosion wiring since 1973.**

I/O OTM wins a Logitech G5!

There's a mouse in the house. Okay, it's not in the house, it's in IO. And it looks damn good.



Core core core core socket

I have a question related to quad-core CPUs.

How does the operating system see this processor? As two CPUs (as there are two dies), as four CPUs (for each core)...?

What about hyper-threading? My Core 2 Duo doesn't seem to support HT, so I guess the C2Q doesn't either.

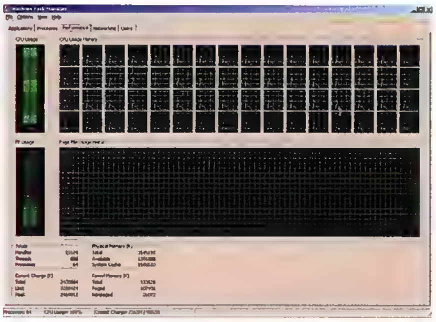
I'm more concerned about Windows XP Pro, as it seems the limit for that is two physical CPUs.

Gilles Reichert

You'll be pleased to learn that Microsoft's artificial processor-number licensing limits apply per individual physical CPU package, not per core.

So if you've got a dual-core CPU, that's one 'processor', as far as Windows licensing goes.

This policy started out when the first Hyper-Threaded P4s turned up. They looked like two CPUs to the OS but really weren't at all, and it would have been ludicrous to insist on a dual-



▲ **To dreeeeammm... the impossible dreeeeammm...**

processor license to use one.

Modern Intel CPUs aren't Hyper-Threaded any more, mainly because the Pentium M core that begat the Core series didn't support it. Apparently HT will be coming back in the new Nehalem chips, though, making four-core chips look like eight and eight-cores look like 16.

Back in the present day, even though Core 2 Quad CPUs have two whole physical dual-core CPUs on the silicon inside them, they still only count as one processor from Microsoft's point of view. So you'll still be fine even if you have WinXP Home, which only supports a single processor.

(If you decide to boot Windows 95/98/ME for some reason, it will of course only use one core of your CPU; it doesn't have any multi-core-supporting code.)

Microsoft has a somewhat dated page on this subject - **tinyurl.com/88rke**.

"...and the water wheel hooks up over here..."

I I have several old APC SmartUPS UPSes in my garage attic that are no longer useful because their batteries are shot, and APC no longer sells direct replacements. These old SmartUPS devices have pretty good chargers and inverters in them. So I'm thinking about just using my own replacement batteries.

Is there any reasonable limit on how much battery capacity I can insert into one of these devices? Could I put in batteries with twice the original amp-hour capacity? Five times? Ten times?

I'm not so much worried about destroying the UPSes - as I mentioned, they're just collecting dust (and probably mouse droppings), anyway. I'm worried about sinking a bunch of money into deep-cycle lead-acid batteries for this project, only to learn that it won't work like I hope.

Greg Reed

O It's possible for large battery capacity to over-strain some charger designs, or trip a sanity-check circuit – if a charger notices that it's put ten times the energy into its battery as it thinks it should be able to accept, it may decide to stop in case this indicates a house-fire in the making.

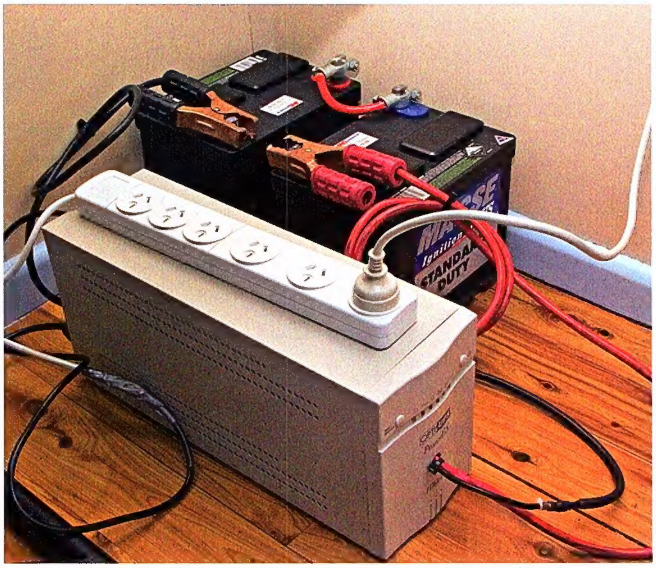
But realistically, I don't think either of these problems is likely to arise with consumer UPSes. Their charge circuits are current-limited, so they may take a long time to charge a giant battery bank but won't have any other problems, and they're not smart enough to complain about strangely lengthy charge times.

The whole idea of a big-ass battery bank is that only a once-in-50-years blackout should be enough to completely drain it, so expensive deep-cycle batteries are not necessarily required. I suggest you buy the finest, cheapest, off-brand car batteries your local big-box store has to offer, and build your first battery bank out of those.

It's difficult to put an exact figure on the capacity, for UPS purposes, of non-deep-cycle batteries, as I explain in **www.dansdata.com/upsupgrade.htm**. But you should be able to count on an easy ten repeatable amp-hours from even the crappiest of small $40 12V car batteries. 20Ah is not out of the question from cheap batteries, provided the charger clicks on pretty soon after that much discharge to get 'em back out of the sulfation danger zone.

(On the subject of which, I think 'desulfator' gadgets do actually work, and allow you to revive a lead-acid battery that's been over-discharged and sulfated into uselessness. I've not yet actually demonstrated this by personal experiment, though.)

The relatively gentle charging and discharging that car batteries will get from a domestic UPS also means that they're likely to behave themselves very nicely, and not bubble sulfuric acid out all over your floor or anything. The two dirt-cheap batteries I've had sitting in the corner of this office for the last couple of years (I should probably add a bit of distilled water some time soon...) haven't missed a beat.



Blackout? What blackout?

Not guaranteed to actually kill anyone

I I was perusing a random messageboard and saw a Google ad for 'Killer NICs' (**www.killernic.com**).

A two to three hundred dollar 'gaming' network card.

Sounded kind of ridiculous to me to start off with, but then I got to reading the details...

I knew some NICs load the CPU more than others, depending on their operation, but that was about my extent of knowledge.

Are these things worth the dosh? Ever heard of them?

Dave

O The Killer NICs have been around for a couple of years now, and both the original M1 model and the cheaper, less ridiculous (no giant pointy Klingon heat sink) K1 do, more or less, what it says on the tin. They're probably not actually worth buying, though.

The Killer NICs aren't traditional network cards. They're a whole very specialised computer on an expansion card, which really does offload pretty much all network-card duties.

The onboard wired network interfaces that most people use are, in contrast, primarily software-based; the driver, and thus the CPU, does all of the heavy lifting. This approach is a good way to make cheap hardware, which is why it's been used for printers, modems, RAID cards and all sorts of other stuff for many years now. But it's obviously better to offload that work if you're doing something that's CPU-limited and need more cycles for the primary task.

The question is whether your game actually is CPU-limited enough that the relatively small load of the network interface makes a difference.

With the current drivers, the Killer NICs apparently work very well, but you can still only expect a frame rate and ping improvement of a few per cent, and you'll only get that when your CPU's the limiting factor - which it won't necessarily be.

As far as I know, everybody's only compared the Killer NICs with cheap software-assisted NICs, too. There are plenty of server-class network cards that at least approach the Killer NIC design, but cost rather less. I bet that if you put one of those in your game box you'd get benchmarks pretty darn close to a Killer NIC.

The Killer NICs have other features – a firewall, a freakin' BitTorrent client and so on – but you can get all of that stuff from cheap outboard hardware that'll do it just as well, and not require your computer to be powered up for it to work.

So feel free to spend $200 or more on a Killer NIC if you like, but I can't help but think that putting that money toward your next CPU and/or graphics card upgrade would give you a lot more return.

FALLOUT

Funnies and humour from the fallout zone

Where's the Earth-shattering kaboom?

Logan Booker puts the pedal to the metal and tries not to explode.

Living on the edge is great. Not a literal edge, of course. I can't imagine building your house on the lip of a precipice would be much fun, especially if the door was on the cliff side and the back door budget was blown on Atari shares.

No, the edge I'm talking about is the one you tiptoe along when your CPU's running a few hundred MHz above its stable overclock, or ramping the RPM to maximum on your box's variable speed fans to keep your hardware cool.

In my case, it was demanding just that bit more from the tiny PSU that came with my HTPC. That sucker powered a motherboard, TV tuner, DVD and hard disk drive, a 3.4GHz Pentium 4, four fans, two sticks of RAM and a GeForce FX 5600. And let me tell you, that machine got *hot*. My Xbox 360 was so envious it refused to red ring of death just so it could keep pace with the HTPC's gamma-like emissions.

I think I got eight months out of that system before it met an undignified end. I was sitting in my bedroom, happily browsing for ham and fruit porn when I heard a squeal and a pop from the living room. This was followed by the power going out, and another squeal, though this was from me and embarrassingly feminine (or is that alluringly feminine? *–ed*). A picture of honey-smoked meat molesting an overripe avocado vanished from my PC's screen and silence blanketed the apartment.

At first I thought it might have been my gaming box, despite the location of the earlier aural indications. I got down on my knees and sniffed the back of my PC, close to where the PSU was located. Other than finding it oddly arousing, I discovered nothing amiss. I made my way out and scanned the living room, looking for signs of smoke, fire or undetonated grenades. Only after a thorough stalking of the space, my nose snorting great whiffs of stale bachelor-pad air, did I determine that my HTPC was the culprit.

Now, I've almost killed myself by wiring a PSU the wrong way. Years before I'd attempted to attach a PSU to a case power button using completely random, though confidently executed, directions. When I turned it on, sparks fired out the back, frying the PC, scorching the extension cord it was plugged into and leaving deep, black scorch marks along the skirting board of my room.

In short, the idea of prying open the HTPC to investigate had me terrified. I'd rather have faced a pack of zombie squirrels with a taste for man nut. Yet somehow, I found the courage I needed and cracked the box open.

Of course, nothing happened that would deprive me of a limb, my eyesight or dashing good looks, other than a puff of ozone from the cooked PSU. It was a simple process of salvaging the working parts and committing the busted stuff to the big electronic cloud in the sky.

What did happen is that I learnt my lesson. Sure, it's nice to push the limits, but not if it means facing your fear of testicle-eating creatures, exploding PSUs or revealing your addiction to food sex to your flatmates.

And not the cool kind of food sex.

NEXT MONTH

GAMING PCS

It's time to put the PC big boys to the test, with our round up of the ultimate in desktop gaming rigs. Prepare to see the best in the field go head to head in a battle for gaming supremacy!

COMPUTEX

Josh Collins is heading to Taiwan for the biggest PC tech show of the year. He'll be keeping his nose to the ground for all the latest news.

CABLE GUY

We take the confusion out of AV cabling with Atomic history of, and guide to, the various formats that have plagued our TV cabinets over the years.

PC MOD AHOY

Ron downs tools after his latest efforts to deliver some more down to earth examples of PC case modding we can all aspire to. But it'll still be cool!

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